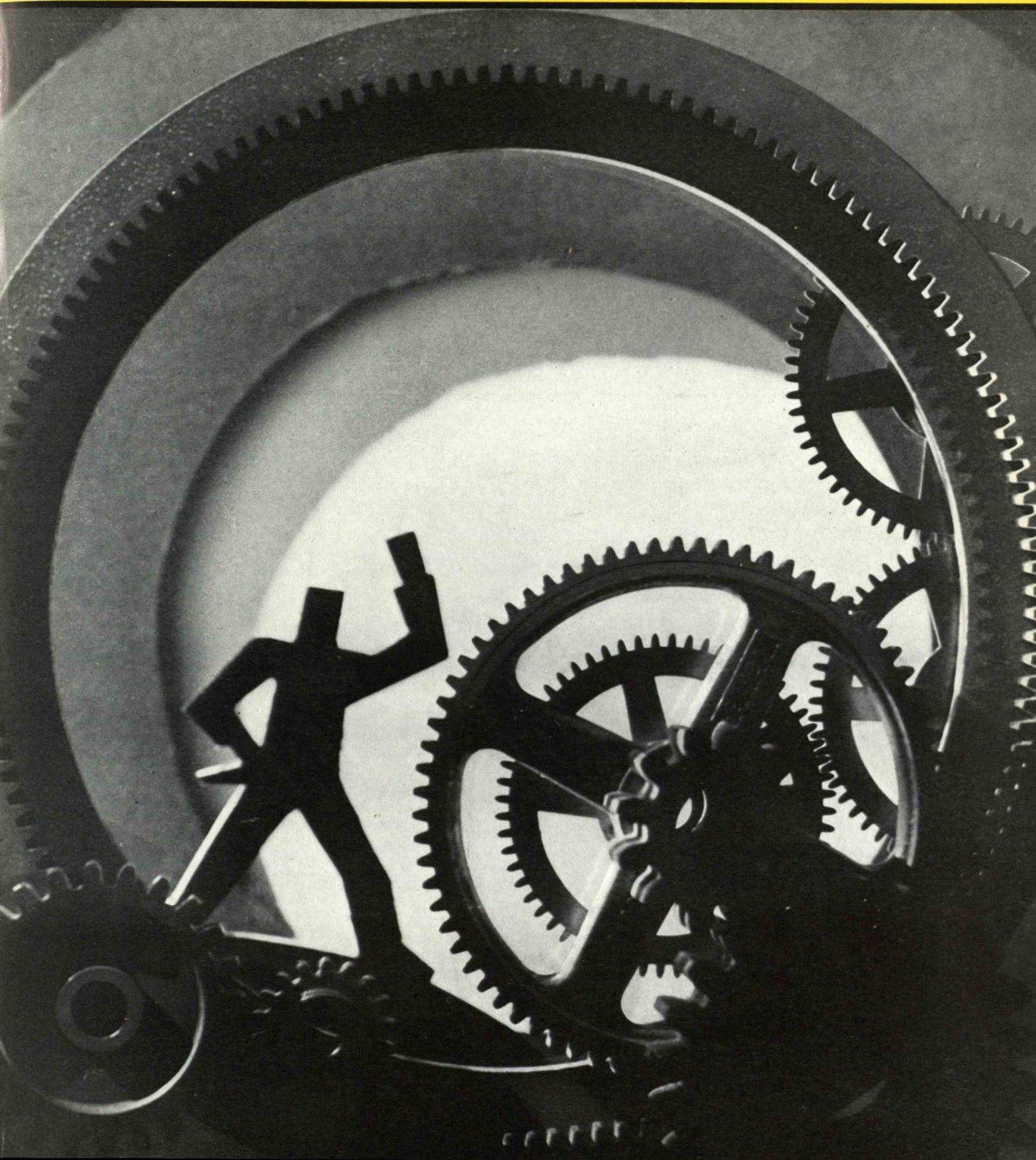


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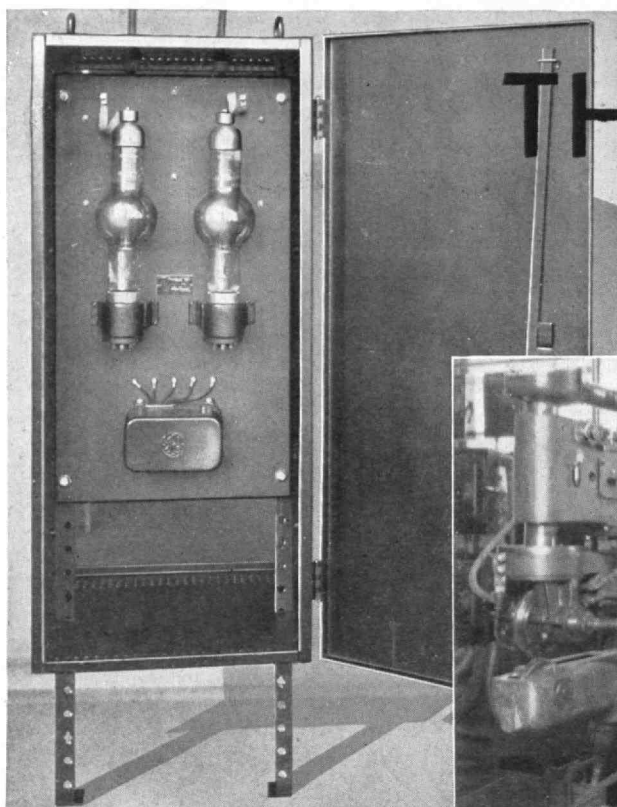
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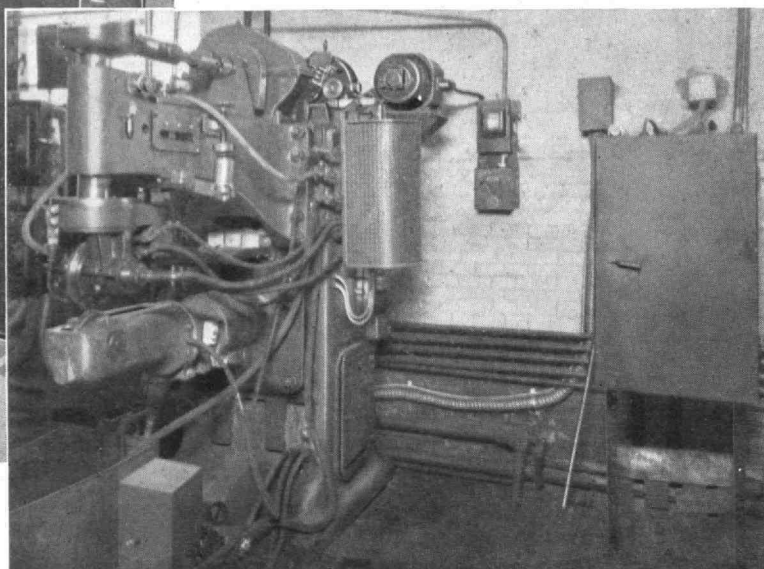
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Close-up of a Thyatron control panel for high-speed welding applications

G-E Thyatron control equipment (in case) operates this line welder through a reactor



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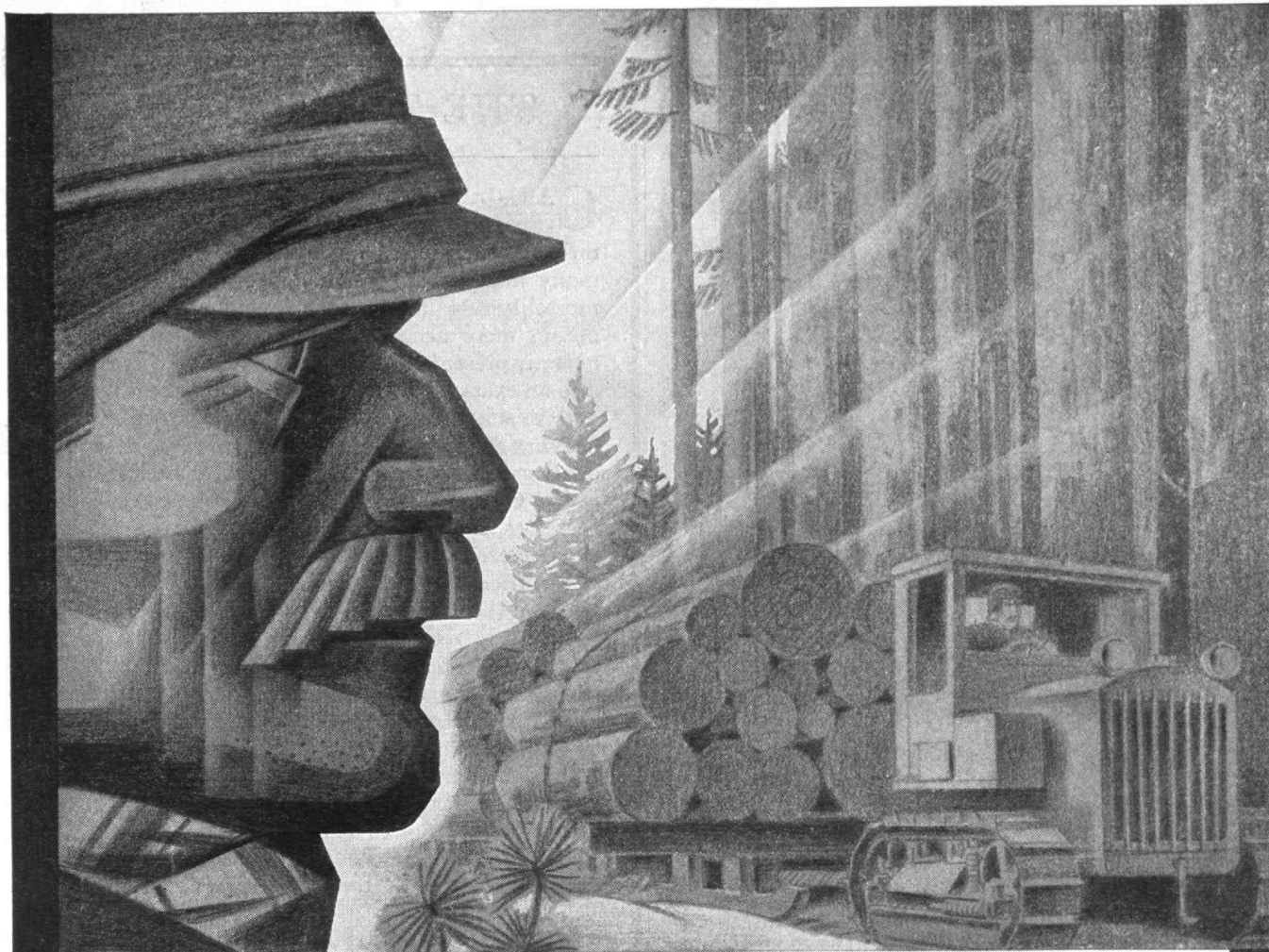
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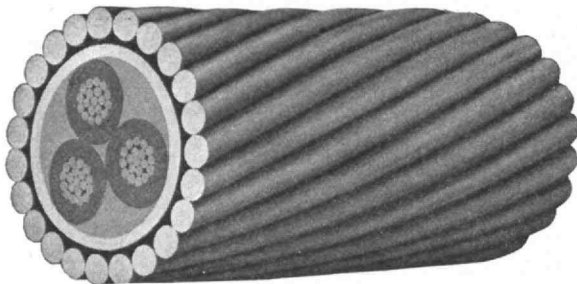
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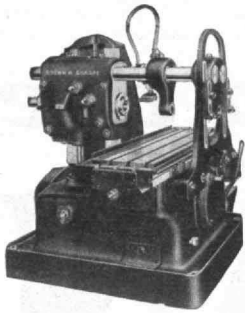
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THE TABULAR VIEW

CARDIAC diseases cause more deaths in the United States than any other affliction. The forces of medical science are converging upon the problem from many angles with the hope of lowering this terrific mortality rate and one example of what is being done to obtain more accurate information about the human heart is presented as the first article in this issue. It is also an example of the bonds which connect apparently diverse scientific subjects. In this instance, the physician has called in the electrical engineer to devise a new cardiograph for studying electrically the action of the heart. ¶ Physician and electrical engineer collaborate, therefore, in the preparation of this announcement of a new electrocardiograph. VANNEVAR BUSH is Professor of Electrical Power Transmission at M. I. T. In 1928 he received the Louis Edward Levy medal of the Franklin Institute in recognition of his distinguished contributions to physics and electrical engineering. He has supervised the design and construction of the various integrators and analyzers which have been developed at the Institute, and one of these is described on page 171. W. D. REID is an Associate Member in Cardiology at the Evans Memorial Hospital, of which that well-known contributor to The Review, Dr. Allen W. Rowe, '01, is Director. Dr. Reid is also Assistant Professor of Cardiology at the Boston University School of Medicine.

PRESIDENT COMPTON of M. I. T. by word and action exalts the position of the engineer in society. His article in this issue is a fitting sequel to the stirring article by Stuart Chase entitled "Prometheus Enchained," which appeared in The Review for November, 1930. ¶ HAROLD E. LOBDELL is, of course, the publisher of The Review and Dean of Undergraduate Students at the Institute. His collaborator, H. H. W. KEITH, is Professor of Naval Architecture at M. I. T. In addition, he is an advisor on launching problems for the Fore River shipyard of the Bethlehem Shipbuilding Company. He is also consulting architect for that firm and takes an active part in the design and construction of warships built there. Professor Keith is a reserve officer in the Navy, and at the present time is taking an active part in the design of a proposed experimental naval tank to be built at Technology.

RALPH E. FREEMAN is Assistant Professor of Economics at M. I. T. After graduating from McMaster University in Canada, he went to Oxford as a Rhodes Scholar, studying in Balliol College. Subsequently, he held a fellowship in the Department of Economics at the University of Chicago, and he was for six years Head of the Department of Economics and Political Science at the University of Western Ontario. He is the author of "Economics for Canadians," published in 1928. In addition to his teaching, he has had valuable experience in business. ¶ Professors Tenney L. Davis, '13, and Norbert Wiener are two of The Review's star *feuilletonists*. Professor Davis is now back in the States.



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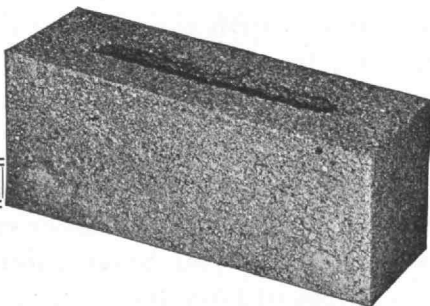
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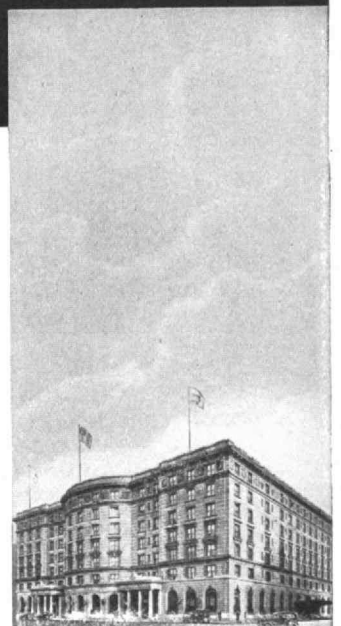
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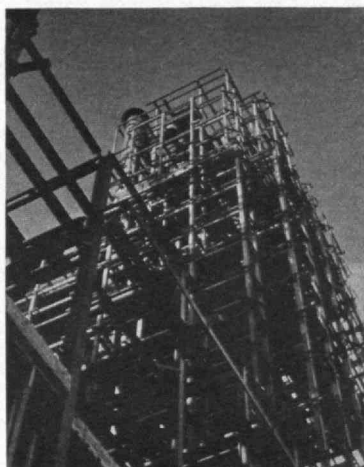
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A NATIONAL JOURNAL DEVOTED TO SCIENCE, ENGINEERING, AND THE PRACTICAL ARTS

Edited at the Massachusetts Institute of Technology

VOLUME XXXIV

NUMBER 4

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From a pencil and crayon drawing by Leopold de Postels of the de Postels Studio

Leopold de Postels

AT THE behest of a traveling public insatiable for speed, spectacular size, and voluptuous luxury, the shipbuilding industry is strenuously planning ships that are a little longer, a bit swifter, and more elaborately comfortable. In the article on page 165, this course of events is analyzed, and in the tables on pages 166 and 167 an inventory of the world's great passenger vessels, built or planned, is presented

THE TECHNOLOGY REVIEW

Vol. 34, No. 4



January, 1932

THE HUMAN POWER PLANT

Peak Capacity of American Hearts over Half a Million H. P.

BY V. BUSH AND W. D. REID

Editorial Note. This article contains an announcement of a new and marvelously sensitive electrocardiograph for studying the action of the heart. The device is the result of joint research carried on by the Evans Memorial Hospital, Boston, and the Electrical Engineering Department of M. I. T.

HUMAN hearts of the United States develop normally a combined output of about 70,000 horse power, an amount approximately equivalent to that necessary on the average for light and power in a city the size of Boston. They have, moreover, a very large overload capacity, and can produce in a pinch about eight times normal output for a short interval. The installed peak internal pumping capacity of the population is hence over a half-million horse power. This pump delivers some 130 billion gallons of blood a day which is about 40 times the total flow of water used for all domestic purposes throughout the country, nearly equivalent to the flow of the Niagara River, or enough to fill the largest reservoir of the world behind the Hoover Dam in two months' time. The aggregate size of this pumping plant is therefore considerable, but its size is completely overshadowed by its reliability.

Most hearts proceed throughout a complete lifetime without servicing, completing a total of 2,000 million fairly complex complete operations without overhaul or major failure. An automobile engine, after an extreme life of 50,000 miles of operation, completes only 200 million revolutions, or 10% of the complete operations of a heart; and it very seldom does this much without overhaul.

About one heart in six actually fails in service. This ratio would be significantly decreased if hearts were given the periodic attention habitually lavished by many on fine motors, and if the accumulated knowledge of cardiac experts were utilized freely by those whose hearts were shown by diagnosis to have need of service. It is not considered good form to operate a fine car with leaky valves. Those of the heart cannot be taken out and ground, it is true, but many an incipient leak can, nevertheless, be rectified.

The heart is not only a pump, it is also a generator of electricity. Like other muscle tissues its operation is accompanied, in a way which is still in its detail mysterious, by the production of differences of electrical potential. That the actuating mechanism of a muscle is susceptible to electrical stimulation became convincingly apparent when, about 1770, Galvani first made a frog's legs twitch by connecting crude electric cells between a nerve and muscle. It had, in fact, been illustrated much earlier by the violent contraction of the muscle of the first victim to pick up inadvertently a charged Leyden jar. Similarly, it has long been known that natural muscular contractions are accompanied by changes in electrical potentials, and as early as 1855, Kolliken and Müller demonstrated that this was true of the heart muscle of a frog.

As an electrical generator, however, the human heart is not a powerful apparatus. The electric eel, *electrophorus electricus*, can generate in some very clever way enough electrical energy to stun a large antagonist, and this in spite of the fact that he

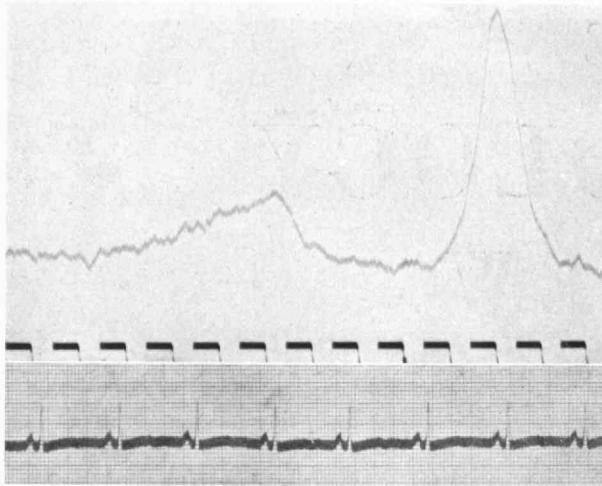


Figure 1

appears to be continuously short circuited by the medium in which he lives. Compared to this eel, man is a weak generator indeed. Accompanying heart action, there appears at electrodes placed far apart on a human body a difference of potential which has a value when averaged against the total time of about one-quarter of a millivolt. The body resistance varies widely, but a representative value is about 2,500 ohms. Hence the maximum of the mean electrical power output into an external circuit from this source of potential difference can be only about six micromicrowatts, or, in the terms previously used, about one one-hundred-million-millionth of a horse power. If applied for lighting purposes this amount of power would be capable of giving a one-second illumination of a small flash light bulb once in a thousand years. This is not a large amount, yet the accurate measurement of the time variation of this potential difference furnishes one of the accepted means of investigating the performance of the heart. This is the subject of electrocardiography.

In 1887 Waller made use of the capillary electrometer on man, and in 1892 Bayliss and Starling obtained the first good records which could truly be called electrocardiograms. The capillary electrometer, which has now been largely forgotten by experimenters, consists of a column of mercury in a capillary tube on top of which is sulphuric acid, and it depends for its action upon the fact that the surface tension in the interface is considerably changed when the interface is polarized. The fact that this instrument was successfully used to record the rapid variations in the weak potential difference accompanying heart action, crude though the results were bound to be in terms of present-day technique, excites intense admiration when one properly evaluates the work in terms of the experimental situation of the time.

In 1903 Einthoven of Leyden introduced his string galvanometer, and the use of this greatly simplified the problem and rendered possible rapid advance. This instrument consists essentially of a very fine wire stretched in a powerful constant magnetic

field. Very minute currents through the wire cause it to deflect appreciably, and optical arrangements make possible a time record of the movements. A typical record obtained in this manner is shown at the bottom of Fig. 1. For nearly 30 years and until quite recently this has been the only working tool for both clinical and research electrocardiography. It has accomplished much, and by its use has been built up an invaluable record of experience, so that this form of the electrocardiograph has certainly made it possible for the modern physician to understand numerous cardiac conditions and often to apply effective treatment to sick human beings in a way that was quite impossible to physicians of a few decades ago. String galvanometer studies have gone far to determine what drugs are really valuable and what are ineffective or worse. The instruments are used in many of the larger hospitals and clinics throughout the world and much significant knowledge has been obtained by careful correlation of electrocardiographic findings in life with conditions disclosed at post-mortem examinations. Yet the string galvanometer has very serious limitations, and the art of measuring minute electrical magnitudes has proceeded far since Einthoven's work in 1903.

THE advent of the thermionic tube really revolutionized the technique of fine electrical measurement. Concurrently with its widespread use in radio and telephony it has had a less spectacular application in all sorts of investigatory work in the laboratory. This is primarily due to two outstanding characteristics which render it uniquely applicable to the measurement of rapidly varying or very weak phenomena. The first of these is its almost complete lack of inertia, the only time-lag present being due to the small time it takes for an electron to pass over the short distance from the filament to the plate. Thus, as an oscillator, it can readily be made to repeat a predetermined performance 100 million times per second. The second characteristic is the fact that a significant power output from its plate circuit can be accurately and completely controlled by an extremely small input to its grid. How small this can be is not always realized. A tube recently produced by the General Electric Company, and designed to have a very low grid current, can operate

with an input current of 10^{-17} ampere. Several analogies have been given to aid in visualizing this magnitude, in comparison with the full ampere taken by an incandescent lamp of moderate size, but, if it is permissible to add to these, the following analogy seems to have been overlooked. If the single ampere in the lamp be represented by all the women of this country talking in unison at the rate of 150 words per minute, then the grid

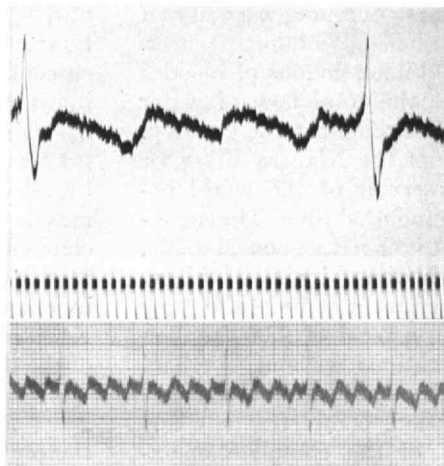


Figure 2

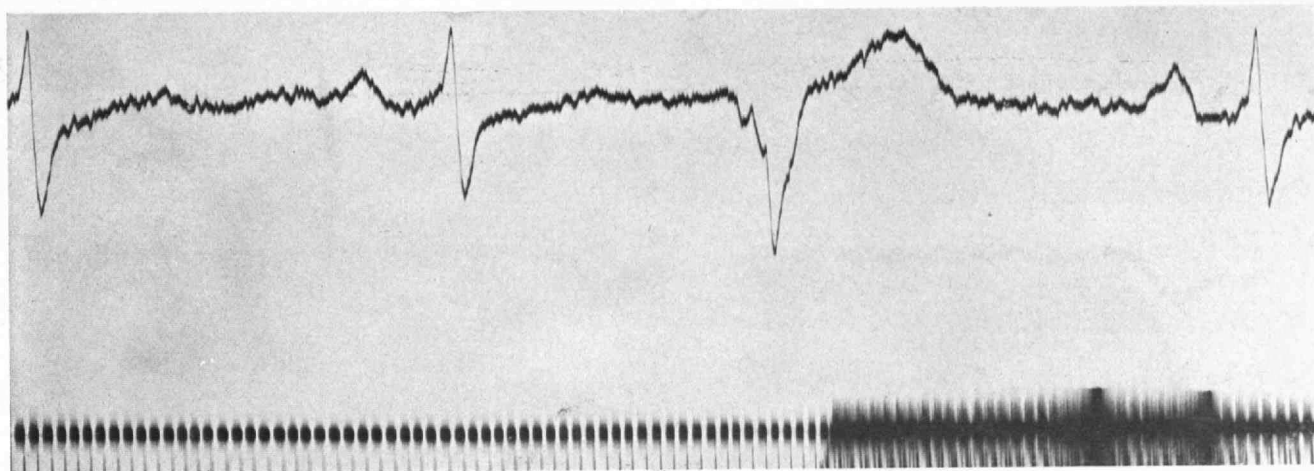


Figure 3

current of the tube is represented by a lone mountaineer in the Smoky Mountains who enunciates one monosyllable in 30 years.

It is inevitable that the thermionic tube amplifier should be applied to cardiography and to analogous problems of the physician, the physiologist, and the biologist. Much has, in fact, been accomplished, and work such as that of Adrian * on the electrical potential differences appearing in nerves, and of Osterhout † on the electrical phenomena occurring in a single cell of *Nitella* (a fresh-water plant with cells six inches in length) is notable. Several electrocardiographs, utilizing thermionic tube amplifiers in conjunction with oscillographs have also appeared. In many of these, quite properly in view of the clinical records available in this form, the attempt has been to duplicate the results given by the string galvanometer rather than to improve upon them, and to provide added convenience and portability. It is evident, however, that there is an opportunity to overcome some of the string galvanometer's limitations as well. With this object in view a coöperative research has been conducted in

which the Evans Memorial has worked closely with the Department of Electrical Engineering of the Massachusetts Institute of Technology. This has resulted in the production of an instrument, which, in its present form, is decidedly a research tool rather than a clinical instrument.‡ It is not intended that such an instrument should immediately supersede the string galvanometer, for to fail to use to the utmost the experience which has been obtained with that instrument would be unfortunate. Rather, it is hoped that instruments of the new type may be extensively developed to supplement the work of the galvanometer and produce additional results, a new set of facts, and a body of experience which with the old instrument and its limitations was unattainable and the existence of some of which was hardly suspected.

The new instrument has primarily accomplished three things as compared to the old. First, by extending the range of frequencies which can be readily recorded, it has brought out detail which was lost or barely discernible in the older records. Second, by drawing a negligible current for its operation it has avoided errors due to the flow of significant current through the

* Adrian, E. D.: "The Impulse Produced by Sensory Nerve Endings," *Jour. Physiol.* 61:49, 1926.

† Osterhout, W. J. V.: *Electrical Phenomena in the Living Cell*, Harvey Lectures, Series 25, Williams and Wilkins Company, Baltimore, 1931, p. 169.

‡ Reid, W. D.: "Preliminary Report on the Use of an Improved Form of Electrocardiograph," *Jour. Lab. and Clin. Medicine*, in press.

Caldwell, S. H. ['25], Oler, C. B. ['31], and Peters, J. C. Jr. ['30]; "An Improved Form of Electrocardiograph," soon to be published.

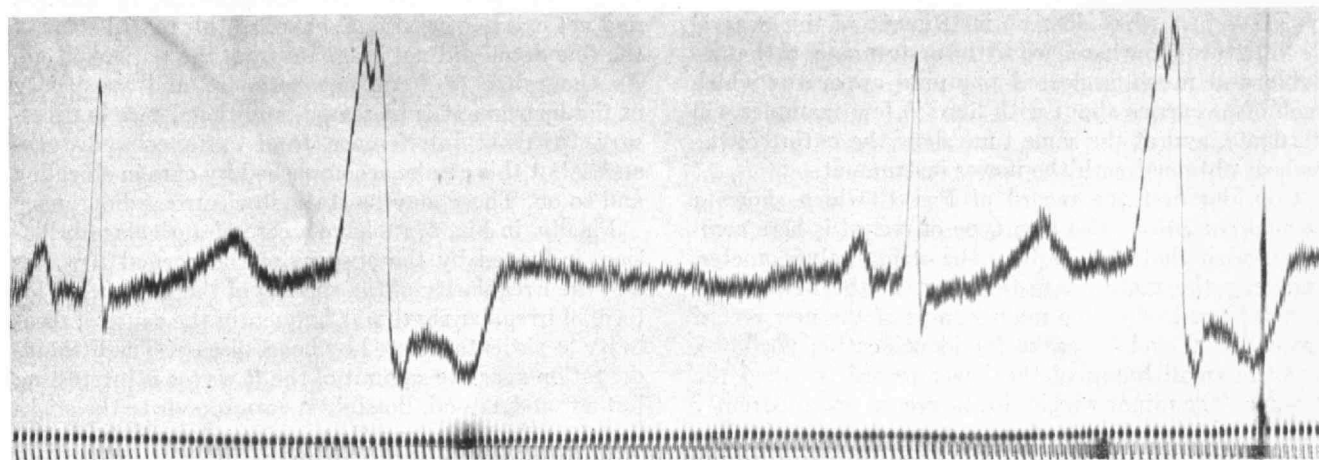


Figure 4

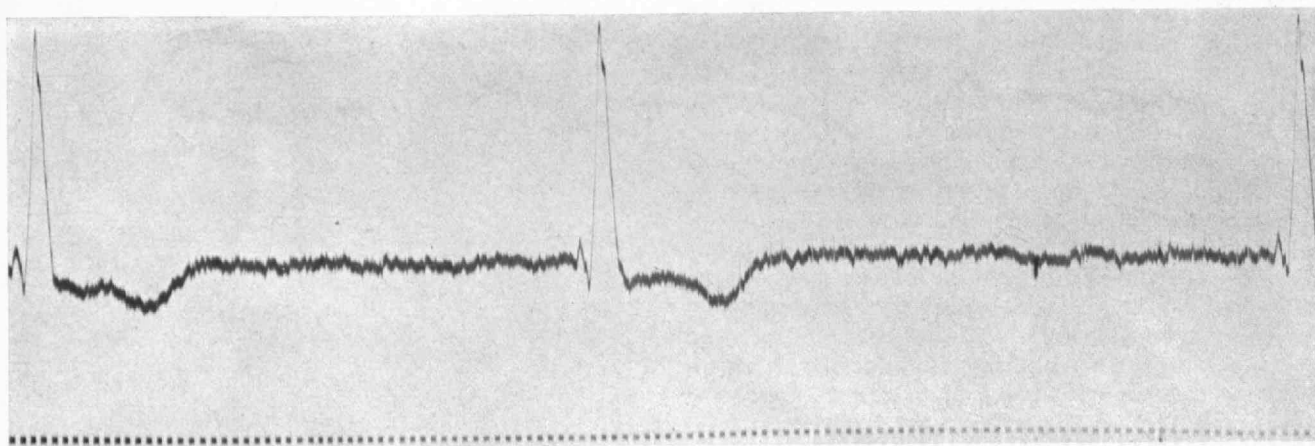


Figure 5

variable impedance of the skin layer. Third, it has produced an enlarged record with a relatively fine line. Its use gives the sensation that now one can study under high power, of the microscope as it were, what formerly could be viewed only under low power.

It will doubtless take considerable time plus the examination of many patients and careful correlation of the new records with the findings on living patients and at post-mortem examinations to determine what new information of value will be obtained by use of the improved form of electrocardiograph, but it requires little enthusiasm to feel that the use of this instrument will throw further light upon conditions pertaining to the heart and circulatory system. Later on, instruments of this sort, which can readily be designed to have many features of convenience, may well take the place of the older type. While conservatism among the medical profession in regard to a change of this sort is entirely laudatory for the reason given, a major change in technique once in a generation is hardly to be termed radical. With the advance which has occurred in the art of measurement, and with the present situation in which almost identical apparatus to that employed in this investigation is being utilized for the measurement of weak electrical potential differences for all sorts of purposes in large numbers of scientific laboratories, an ultimate change in this direction appears inevitable.

NOW just what does an instrument of this general nature show in regard to the performance of that reliable and much neglected pumping apparatus which each of us carries about with him? A few examples will illustrate, and at the same time show the nature of the records obtained with the newer instrument.

Consider first the record of Fig. 1, which shows a normal condition. The new type of record is here compared with that obtained by the string galvanometer, and only the more interesting part of the new record is reproduced. The two main humps of the new record are called P and R waves for identification purposes, and the small hump of the lower record is called the T wave. The minor wiggles in the record are apparently due to incidental muscular contractions, rather than directly to cardiac action; they are enormously increased in size and may even obscure the desired record

if the patient is tense. The little irregularities on the side hill of the R wave may, however, be of much significance, as they are repeated with considerable faithfulness in the records of successive beats. Since they are indistinguishable in the older records they have not as yet been much studied. Here the heart is firing regularly on all four cylinders, the valve setting is normal, the valves are tight, and the ignition system is functioning smoothly. Many years from now this particular heart will probably be still going through its complicated performance accurately and reliably, much to the satisfaction of its owner.

Now consider Fig. 2. In this heart the ignition system is decidedly out of adjustment and one cylinder is being fired several times per cycle. This is a case of auricular flutter. Part of the heart, the auricles, is in a state of constant activity. It would be difficult to conceive of a man-made motor which would continue to function under similar conditions of maladjustment.

Fig. 3 shows normal rhythm interrupted by extrasystoles, one being shown by the inverted wave not preceded by a P wave. This machine is missing. Strange to tell, it is apparently a harmless condition, and does not call even for new spark plugs or adjustment of the distributor. Backfires into the carburetor do not appear to be cause for alarm with the heart.

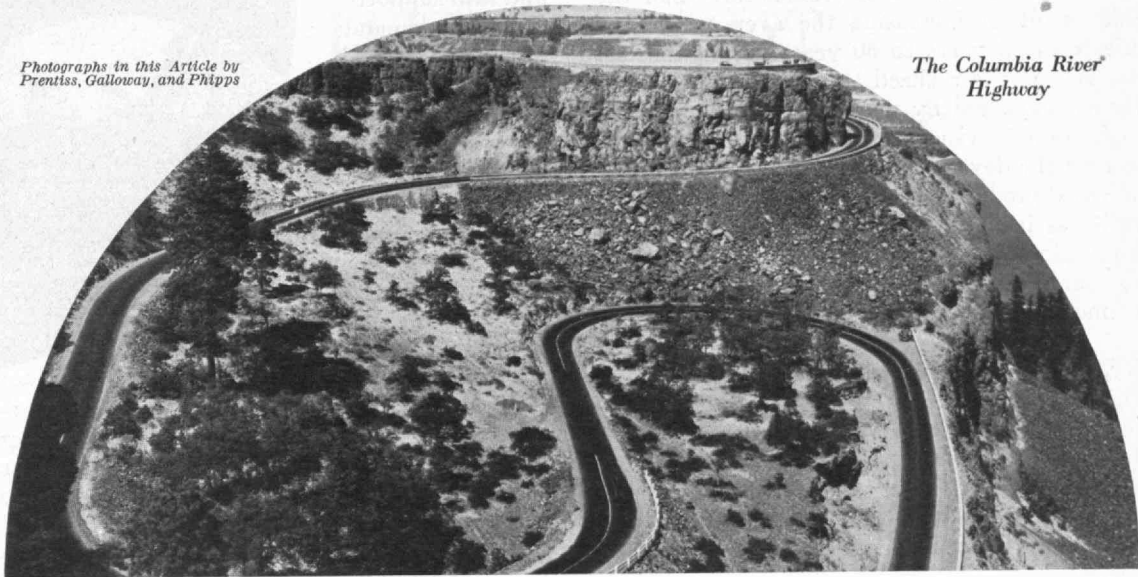
Fig. 4 presents another case of extrasystoles, shown here by the wide bifurcated wave. This heart appears to have something akin to explosions in the muffler, and yet it is not in serious shape. In this record some of the fine detail did not emanate from the patient at all. As the range of frequency response and sensitivity of the instrument is increased, additional care is necessary to avoid interference from extraneous disturbances, but this can be accomplished by care in shielding and so on. There may be static in electrocardiograms.

Finally, in Fig. 5, we have a case of auricular fibrillation, indicated by the absence of the normal P waves and the irregularity of the spacing of the R waves. This form of irregular rhythm is frequently the cause of disability in patients affected by heart disease. The little indentation near the summit of the R waves is interesting but not understood. Possibly it corresponds to the sticking of a valve stem, and then again perhaps it does not.

The instrument now available is a reasonable tool for electrocardiographic research, (*Concluded on page 188*)

Photographs in this Article by
Prentiss, Galloway, and Phipps

The Columbia River
Highway



THE FUTURE OF ENGINEERING

Its Significance as a Social Force

BY KARL T. COMPTON

INTELLIGENT interpretation of the observed course of events in the past is the only valid method of predicting the course of events in the future. I should like to follow this method to investigate from several aspects the probable place in society which the engineer will hold in the near future.

In the past, the great developments in civilization have taken place under conditions in which there was a sufficient productive power to give the necessary leisure for education and constructive thought. In the ancient civilizations of the Egyptians, the Greeks, and the Romans, this productive power was obtained through the use of slaves captured in war. By their efforts their conquerors were freed from the necessity of continually struggling to acquire means of sustenance, and were able to devote their time to art, to the construction of great monuments, to the initial investigations in science, and to the establishment of systems of law and government.

Again in the period of the Renaissance, the great advances in civilization were made by the leisure class and the members of the religious organizations, both of whom were supported by the efforts of their fellow men who tilled the soil or wove the cloth.

The tremendous advances of our own civilization during the past 50 or 100 years are due more than anything else to the harnessing of the power of steam and the utilization of the energy in coal and water power. The socially important aspect of the machine age is not the machines themselves or the great structures which have been built, but is to be found in the fact that the

tremendously increased productive power brought into being by machinery has released human thought and energy for development in directions other than mere existence.

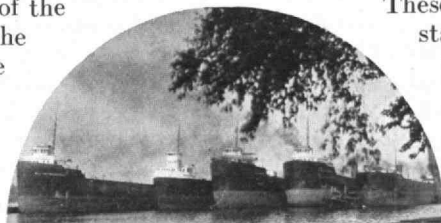
The time which has been freed by increased productive power is now devoted in youth to education. It is this which has made possible the universal system of education which is adopted in this country and which has made possible college and postgraduate training of a large portion of our youth. Thus, while the productive power *per se* is unimportant, the opportunities for education and cultural development which are made possible through increased productive power are perhaps the most important benefits inherent in our present civilization.

Because of increased productive power, it is no longer necessary to devote all of our efforts to the production of the bare necessities of food and shelter. An increasing portion of our effort goes into things which, for a time, are called luxuries, but which very quickly come to be looked upon almost as necessities. These are such things as modern household equipment, modern methods of communication and transportation, newspapers, books, radios, and the like.

Every one of these things adds to comfort, to interest in life, and to opportunities for self-expression.

These things, furthermore, present constantly new lines of interest and objectives for study and development. Thus the mental as well as the physical life is benefited.

Still another by-product of productive power is the opportunity which has been created for studies



in health and sanitation. These studies have had the remarkable result of increasing the average span of human life from 33 years to 60 years within the last 140 years. When it is realized that untimely death is frequently accompanied by unusual suffering, it takes little imagination to visualize the great benefit which has come with the development of medical science.

It is increased productive power which makes possible such benefits as insurance, old-age pensions, disability and retiring allowances, unemployment insurance, and all of those similar means for relieving anxiety and suffering in times of disability and old age.

THERE are some people who wonder whether the increased efficiency of production through labor-saving devices and more effective methods may not be responsible for the present state of overproduction, unemployment, and, in short, the economic ills of the present year. Now, what actually are the facts, and what would happen if the acceleration of production were reduced?

During the 30 years, from 1899 to 1929, while the population of the United States has increased from 75 to 121 million, the percentage of the population gainfully employed has remained constant at 39%, the percentage employed in factories has increased from 6% to 7%, and factory wages have increased 300%. The annual value of factory products has increased from 11 billion to 68 billion dollars, of which the part which was added in the process of manufacture has increased from five billion to 31 billion dollars. Of this increased value, the factory worker has received quite uniformly throughout the past 30 years a constant fraction amounting to about 40%.

The significance of these figures may be stated briefly as follows. The introduction of labor-saving devices has not thrown workers out of employment, because the statistics show that the proportion of the population engaged in such work has in reality increased. What has actually happened is that just as fast as a labor-saving device enables one workman to do the work which formerly required three, his wages have increased to the total amount formerly paid to the three, and the other two workmen, thrown out of employment in that industry, have found other higher-salaried employment in new industries which have in the meantime been created by scientific and engineering development. The figures show no tendency for the workers to receive a

smaller proportion of the financial benefits introduced by more efficient means of manufacture during the past 30 years. The workers receiving 40% of these benefits, the remaining 60% is chargeable to development costs and to profit by the stockholders, which profits in turn are rapidly turned over into the development of still newer industries,

and into supporting the demand for additional products. In this way, the luxuries of yesterday, such as the telephone, the automobile, the automatic refrigerator, and so on, become the necessities of today, and become available to an ever-increasing proportion of the population.

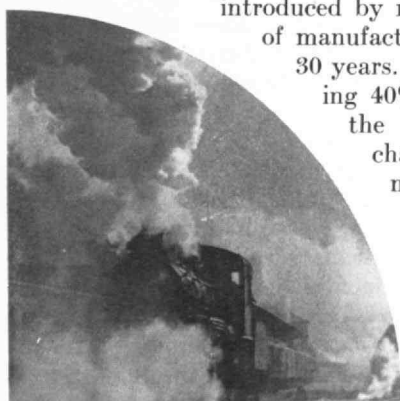
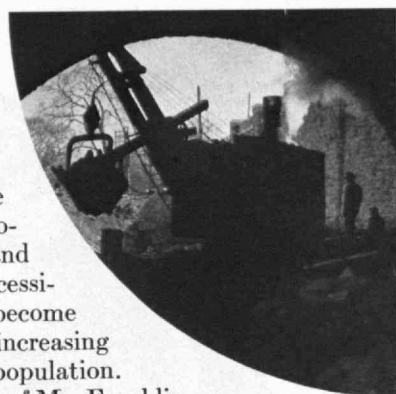
To quote the words of Mr. Franklin Hobbs: "The machine age has increased employment, increased wages, made work easier, saved lives and limbs, and enabled the working man to live in such comfort and luxury as was unknown to any man on earth when some of us were born.

"Had there been no time-saving and labor-saving tools introduced into factories during these last 30 years, there could have been no electrical appliances, no telephone, no automobile, no moving pictures, no radio, no airplane, and the lowly cigarette which you smoke today would be beyond the reach of a man of ordinary means."

This is not to say that there are no isolated regions and temporary periods in which the balance of production and employment may be upset by the introduction of new devices and methods, but the figures show conclusively that on the average the result of such things has been beneficial.

THE social sciences as well as the natural sciences have an important rôle to play in bringing about more satisfactory conditions of living. I believe it to be demonstrable, however, that it is the natural and physical sciences which create the opportunities for what we call the higher things of life and which are really the basis of great advances in economic and social welfare. Mr. Kettering of the General Motors Company has recently called attention graphically to the difference in the mode of attack by the social scientists and the engineers in handling a common economic problem. He pictures a population of 100 million, of whom five million are unemployed. What measures to alleviate this situation can be taken by the two groups of scientists? The social scientists may devise a scheme for unemployment insurance, doles, restricted and distributed hours of labor, or taxes, which will serve to alleviate the suffering of the unemployed. The engineer, on the other hand, creates the automobile, or the sanitary system of water supply, or the telephone, which prove to be so desirable to the remaining 95 million that the five million unemployed are set to work manufacturing these new products.

In discussing our future outlook in a recent article in *Scribner's Magazine*, the internationally known historian of Columbia University, Professor James T. Shotwell, makes this significant statement: "... but, whatever theory one may adopt as to the ultimate outcome, *the pathway to the future is in the hands of the engineer*, not of the economist, (Concluded on page 185)



LUXURY AFLOAT

Will the Faster and Larger Ocean Liners Earn Their Keep?

By H. H. W. KEITH AND H. E. LOBDELL

SPEED, size, and luxury are hall marks of the great liners which lately have been launched or planned as additions to the world's merchant marine. Two are being built which are to exceed in speed and size any passenger vessel now afloat. Others built or building embody notable advances in safety, in noise and heat insulation, in the sanitary conditions surrounding the preparation of food, and in ventilation and air-conditioning.

But it is in contrivances listed as luxury features with which the newer ships abound. Baths galore (salt, fresh, Turkish, and steam), telephones (intramural and ship-to-shore), elevators and peacock alleys, garages, swimming pools (indoor and outdoor), Ritz bars, gymnasias, brokers' offices and children's playrooms, night clubs, chapels, veranda cafés, sport decks and talkie theaters, penthouse and period suites, beauty salons and apparel shops, staterooms with private piazzas, and sand beaches for sun bathing — all are proudly cataloged to lure jaded travelers to forsake the older ships for the new. Nearly every conceivable gadget which modern hotel-keeping has devised to tempt the ultra-Sybarite has a nautical counterpart, though diligent search of marine literature and steamship company blurbs fails to uncover public admission that any owner has yet dared the egregious stunt of piping radio willy-nilly to every stateroom.

The tables on the succeeding two pages list the present prospective passenger-carrying vessels of over 13,000 gross tons in size which are capable of 20 knots sea speed, or approximately 23 land miles per hour. There are twice as many ships of this class now afloat as were in service 10 or 20 years ago. Additions during 1932 and next year will more than make up for any retirements.

No longer is it axiomatic that the leading passenger ships which ply on the "Atlantic Ferry" between Europe and the United States outrank in size and speed those on other oceans. As an examination of the tables will show, such a magnificent vessel as *L'Atlantique* upholds the traditions of the service maintained under the French flag for over 60 years from Europe to Brazil and the River Plate. It compares most favorably with the *Empress of Britain*, newest flagship of the Canadian Pacific's fleet, or the *Ile de France*, *Aquitania*, *Olympic*, or even the *Europa* and *Bremen*. The time and tedium of a voyage from Europe or America to Australia, or from the United States or Canada to the Orient, have been diminished by ships of a type which before the War would have been foreordained for North Atlantic lanes.

Two superliners, projected for the Cunard and French lines, have tonnages nearly half again as large as any previous merchant ship. As the first to exceed 1,000 feet in length, they will, if ever completed, fulfill a vision with which naval architects have been preoccupied since the

War. The *Baltic* of 1904, famed as the first to exceed a length of 700 feet, was followed after an interval of about seven years by the *Olympic*, which was the first to exceed 800 feet, but only two ships, the *Majestic* and the *Leviathan*, have exceeded 900 feet in length.

Both of these superliners, as well as the *Super-Leviathan* (a near-1,000-footer, still on paper and perhaps destined to remain in that state indefinitely) are planned to have sea speeds of 30 knots plus, nearly 35 land miles per hour. This means that they are aimed at duplicating in regular services the record run at 30.66 knots made between San Pedro and Honolulu in 1928 by the U. S. S. *Lexington*. The Cunarder is to employ single-reduction geared turbines of an unstated horse power; the French ship is to become the largest turbo-electric merchantman and is designed for upwards of 160,000 S.H.P.; for the *Super-Leviathan* one proposal is for geared turbines with a maximum of 180,000 S.H.P. and the other for turbo-electric drive with a maximum of 200,000 S.H.P. The *Lexington* and *Saratoga*, now the most powerful ships afloat, have turbo-electric drives and are rated at 180,000 S.H.P. The *Bremen* lists at 132,000, the *Conte di Savoia* at 120,000, the *Mauretania* at 68,000, the *Empress of Britain* at 64,000, and the *Manhattan* at 34,500.

THE problems of superliners are not so much those of marine engineering as of economics. On the "Atlantic Ferry," to which their use will be restricted, they may be expected to make approximately 19 round-trip voyages a year, assuming that their normal schedule will be about 28 knots, except during the peak load of summer, when traffic may make it feasible to step them up to a weekly one-way trip schedule, operating at about 30 knots. Figures as to their capital investment are meager, but it has been stated that the interior fittings and equipment of the Cunarder are to cost about 15 millions, or approximately the total cost of the *Empress of Britain*, and more than the total costs of the *Manhattan* (about 10¼ millions), the *President Hoover* and *Mariposa* (around eight millions apiece). In lean months especially, the inherent operating expense of the superliners will be burdensome for, roughly speaking, fuel consumption varies as the cube of the speed, and operation at high speeds is accompanied by excessive wear and tear on machinery, not to mention the enormous operating overhead and port charges.

Even in the somewhat smaller vessels, such as the Italian *Rex* and *Conte di Savoia*, the German *Europa* and *Bremen* (four ships comparable in tonnage to the aging *ex-Vaterland* and her two sisters), the financial return on the investment is necessarily low. The economics of large liners was summarized some years ago by Carl E. Peterson in a paper presented before the Society of Naval Architects (*Concluded on page 184*)

The World's Merchant Fleet

Vessels capable of 20 knots or better and over 13,000 gross tons

LISTED IN THE ORDER OF THEIR GROSS TONNAGE

NOW IN SERVICE						BUILDING OR PROJECTED				Service **	
Name and Line	Gross Tonnage	Length (feet)	Sea Speed (knots)	Sea Built	See Foot-note*	Flag	Gross Tonnage (est.)	Length (feet)	Sea Speed (knots)		See Foot-note*
1. <i>Majestic</i> (ex <i>Bismarck</i>), White Star	56,621	915 x 100	25	1921	oil T4	Br.	NoAt				
[Gross tonnage quoted according to rules adopted by British lines. If measured according to United States' rules, <i>Majestic's</i> gross tonnage would be 61,206 and <i>Leviathan's</i> (up to two months ago), 59,956. <i>Leviathan</i> , however, has recently been remeasured and, largely by the reclassification of certain spaces within the superstructures, her former American rating figure dropped from 59,956 to 48,590.]											
2. <i>Leviathan</i> (ex <i>Vaterland</i>), U. S.	54,282	907 x 100	24	1914	oil T4	U. S.	NoAt				
3. <i>Berengaria</i> (ex <i>Imperator</i>), Cunard	52,226	883 x 98	23½	1912	oil T4	Br.	NoAt				
4. <i>Bremen</i> , No. Ger. Lloyd	51,656	898 x 100	26	1929	oil T4	Ger.	NoAt				
[Bremen holds transatlantic speed record of 4 days, 14 hours, 30 minutes, between Cherbourg Breakwater and Ambrose Channel Lightship, averaging 27.83 knots. <i>Europa</i> on one crossing averaged 27.91 knots between these points but, because of variations in her course, took 4 days, 17 hours, 6 minutes, and thus missed the record.]											
5. <i>Europa</i> , No. Ger. Lloyd	49,746	890 x 102	26	1930	oil T4	Ger.	NoAt				
6. <i>Olympic</i> , White Star	46,439	852 x 92	22½	1911	oil T3	Br.	NoAt				
[<i>Olympic</i> and her sister, <i>Titanic</i> , were the first vessels to exceed 800 feet in length. <i>Olympic's</i> passengers on October 27, 1914, witnessed the sinking of H. M. S. <i>Audacious</i> , first British capital ship loss of the War, after she struck a mine while carrying out firing practice off Lough Swilly.]											
7. <i>Aquitania</i> , Cunard	45,647	868 x 97	23½	1914	oil T4	Br.	NoAt				
[Holds world record for "turn round" for large liner: 14½ hrs. at Southampton, October 21, 1931.]											
8. <i>Île de France</i> , French	43,153	763 x 92	22	1926	oil T4	Fr.	NoAt				
9. <i>Empress of Britain</i> , C. P. R.	42,328	758 x 98	24	1931	oil T4	Br.	NoAt				
[Flagship of C. P. R. fleet. Largest vessel plying between British ports. Docked June 22, 1931, at Quebec from Southampton and Cherbourg with average for voyage of 26.22 knots. Has largest swimming pool and only really complete Turkish bath afloat. Passenger capacity, 1,195.]											
10. <i>L'Atlantique</i> , Sud Atlantique	40,945	733 x 92	21	1931	oil T4	Fr.	SoAt				
[Largest vessel plying between Europe and South America. All first-class cabins open on a central avenue in lieu of usual longitudinal galleries separated by funnel casings; a "rue" or street with shops, 460 feet long; first-class dining saloon 115 ft. by 66 ft. Passenger capacity, 1,232.]											
11. <i>Paris</i> , French	34,569	735 x 85	22	1921	oil T4	Fr.	NoAt				
12. <i>Homeric</i> , White Star	34,351	751 x 83	20	1922	oil 2	Br.	NoAt				
[Largest twin screw vessel afloat.]											
13. <i>Augustus</i> , Nav. Gen. Italiana	32,650	666 x 82	20	1927	m. s. 4	It.	NoAt				
[World's largest and fastest motorship and the only motorship with cruising speed equal to 20 knots. White Star's <i>Briannic</i> (26,943 tons) and her sister, the <i>Georgic</i> , launched at the Belfast Yards of Harland & Wolff, Ltd., on November 12, 1931, are the next motorships in size to the <i>Augustus</i> . They possess the highest powered individual sets of diesel propulsion machinery in marine service but have a sea speed of only 17 knots. Cosulich's <i>Vulcania</i> (23,970 tons) and <i>Saturnia</i> (23,940 tons) are fourth and fifth in size among motorships. Each has a sea speed of 19 knots.]											
14. <i>Roma</i> , Nav. Gen. Italiana	32,583	705 x 82	21	1926	oil T4	It.	NoAt				
15. <i>Columbus</i> , No. Ger. Lloyd	32,354	749 x 83	20	1922	oil 2	Ger.	NoAt				

Name and Line	BUILDING OR PROJECTED			Flag	Service **	
	Gross Tonnage (est.)	Length (feet)	Sea Speed (knots)			
No. 534, Cunard [Launching was to take place February, 1932, at Clydebank Yards, John Brown & Co., Ltd.; but, on December 10, 1931, Cunard announced the suspension of all work on No. 534. Will be world's largest marine geared turbine installation.]	73,000	1018 x 115	30 +	oil T4	Br.	NoAt
Super-Île de France, French [Expected launching September, 1932, at Penhoët Yards, St. Nazaire. Will be the world's largest turbo-electric ship except for U. S. S. <i>Saratoga</i> and <i>Lexington</i> . Dining saloon 164 ft. by 115 ft. One galley with single electric range serves 2,000 passenger capacity. In tonnage this ship exceeds combined tonnages of 152 ships in Spanish Armada and the 79 ships of the opposing English fleet. Penhoët Yards also cradled the <i>France</i> , <i>Paris</i> , <i>Île de France</i> , <i>L'Atlantique</i> .]	70,000	1017 x 115	30	oil T4	Fr.	NoAt
Super-Leviathan, U. S. [Preliminary plans ready. Keel laying depends on Congress. Passenger capacity, 2,800.]	59,000	970 x 108	30 +	oil T4	U. S.	NoAt
Rex, Nav. Gen. Italiana [Launched Sestri Levante, August 1, 1931. Passenger capacity, 2,250.]	50,000	880 x 101	27	oil T4	It.	NoAt
Conte di Savoia, Lloyd Sabaudo [Launched San Marco Yard of Cantieri dell' Adriatico, Trieste, October 28, 1931. Passenger capacity, 1,900. Geared turbines. Has 3-unit million dollar Sperry gyroscope stabilizing plant. Each unit's rotor is 13 feet in diameter and weighs 100 tons. Has 18 watertight compartments and 58 watertight cells in ship's double bottom. Will have largest electrical equipment afloat.]	48,000	812 x 96	27 +	oil T4	It.	NoAt

No. 534, Cunard
[Launching was to take place February, 1932, at Clydebank Yards, John Brown & Co., Ltd., but, on December 10, 1931, Cunard announced the suspension of all work on No. 534. Will be world's largest marine geared turbine installation.]

Super-Île de France, French
[Expected launching September, 1932, at Penhoët Yards, St. Nazaire. Will be the world's largest turbo-electric ship except for U. S. S. *Saratoga* and *Lexington*. Dining saloon 164 ft. by 115 ft. One galley with single electric range serves 2,000 passenger capacity. In tonnage this ship exceeds combined tonnages of 152 ships in Spanish Armada and the 79 ships of the opposing English fleet. Penhoët Yards also cradled the *France*, *Paris*, *Île de France*, *L'Atlantique*.]

Super-Leviathan, U. S.
[Preliminary plans ready. Keel laying depends on Congress. Passenger capacity, 2,800.]

Rex, Nav. Gen. Italiana
[Launched Sestri Levante, August 1, 1931. Passenger capacity, 2,250.]

Conte di Savoia, Lloyd Sabaudo
[Launched San Marco Yard of Cantieri dell' Adriatico, Trieste, October 28, 1931. Passenger capacity, 1,900. Geared turbines. Has 3-unit million dollar Sperry gyroscopic stabilizing plant. Each unit's rotor is 13 feet in diameter and weighs 100 tons. Has 18 watertight compartments and 58 watertight cells in ship's double bottom. Will have largest electrical equipment afloat.]

16. *Mauritania*, Cunard 30,696 762 x 88 25½ 1907 oil T4 Br. NoAt
[Held Atlantic Blue Riband 22 years and when 20 years old proved herself capable of steaming at 29 knots to the rescue of a disabled cargo ship. Her sister, the *Laetitia*, was torpedoed and sunk by the German submarine, *U-20*, on May 7, 1915, off Old Head of Kinsale with a loss of 1,198, a marine disaster exceeded only by the loss of 1,517 when White Star's *Titanic* sank after collision with an iceberg in the North Atlantic on April 15, 1912.]
17. *Cap Arcona*, Hamburg-Süd-Amerika 27,561 643 x 84 20 1927 oil T2 Ger. SoAt
[Second largest vessel plying between Europe and South America.]
18. *Conte Grande*, Lloyd Sabaud 25,661 632 x 78 21 1928 oil T2 It. NoAt
19. *Empress of Japan*, C. P. R. 25,000 666 x 87 21 1930 oil T2 Br. NoPac
[Largest vessel plying in transpacific service.]
20. *Conte Biancamano*, Lloyd Sabaud 24,416 650 x 76 21 1925 oil T2 It. NoAt
21. *Duilio*, Nav. Gen. Italiana 24,281 602 x 76 21 1923 oil T4 It. SoAt
22. *France*, French 23,769 690 x 75 24 1912 coal T4 Fr. NoAt
23. *Strathnaver*, P. & O. 22,547 664 x 80 22 1931 oil T2 Br. LoAus
[Largest vessel in London-Bombay-Australia service. Passenger capacity, 1,168.]
24. *President Hoover*, Dollar 21,936 654 x 81 21 1931 oil T2 U. S. NoPac
[Largest vessel, except for *Empress of Japan*, in transpacific service. Passenger capacity, 988. Period suites with private veranda. Garage, "drive your own car off and on at every port, if you wish."] U. S.
25. *President Coolidge*, Dollar 21,936 654 x 81 21 1931 oil T2 U. S. NoPac
[Sister of *President Hoover*. These two ships are the largest American-built turbo-electric vessels, exceeding Panama Pacific's *California*, *Pennsylvania* and *Virginia* by nearly 1,400 tons and at least 3 knots; and being nearly twice the tonnages, though about the same speed, as Ward Line's *Morro Castle* and *Oriente* which maintain 60-hour N. Y.-Havana service.]
26. *Giulio Cesare*, Nav. Gen. Italiana 21,657 602 x 76 20½ 1921 coal T4 It. SoAt
27. *Empress of Canada*, C. P. R. 21,517 627 x 77 20 1922 oil T2 Br. NoPac
28. *Monarch of Bermuda*, Furness-Bermuda 20,500 580 x 77 20 1931 oil T4 Br. NYBer
[Only passenger liner afloat providing private bath with every stateroom, even in second class. First to have "penthouse" suites. Two night clubs, three veranda cafés. Turbo-electric. Passenger capacity, 880.]
29. *Otranto*, Orient 20,032 632 x 75 20 1925
30. *Oronsay*, Orient 20,001 633 x 75 20 1925
31. *Orotas*, Steam 19,970 638 x 75 20 1929 oil T2 Br. LoAus
32. *Orford*, Navigation 19,941 632 x 75 20 1928
33. *Orama*, 19,777 632 x 75 20 1924
34. *Conte Verde*, Lloyd Sabaud 18,765 570 x 74 20 1923 oil T2 It. SoAt
35. *Mariposa*, Matson 18,017 632 x 79 20½ 1932 oil T2 U. S. CalAus
[Air-conditioned dining saloon. Staterooms with private "lanai," or lounging decks. Passenger capacity, 706. Has 16 watertight compartments. Passenger spaces at ship's sides heavily insulated with compressed cork. Electrically equipped from cooking to cargo handling. Dynamo capacity sufficient for a city of 25,000 inhabitants. In trial speed runs December 10, 1931, on Rockland Course off New England coast *Mariposa* made maximum speed 22.843 knots and a mean of 22.274 knots.]
36. *Malolo*, Matson 17,932 554 x 83 21 1927 oil T2 U. S. NoPac
37. *Conte Rosso*, Lloyd Sabaud 17,048 570 x 74 20 1922 oil T2 It. SoAt
38. *Empress of Asia*, C. P. R. 16,909 570 x 68 20 1913 coal T4 Br. NoPac
39. *Empress of Russia*, C. P. R. 16,810 570 x 68 20 1913 coal T4 Br. NoPac
40. *Massilia*, Sud Atlantique 15,363 577 x 64 20 1920 coal T4 Fr. SoAt
41. *Lutetia*, Sud Atlantique 14,783 578 x 64 20 1913 coal T4 Fr. SoAt
[Her sister, the *Gallia*, was torpedoed and sunk in the War.]

Manhattan, U. S. 30,000 705 x 86 21 oil T2 U. S. NoAt
[Launched Camden Yards, N. Y. Shipbuilding Company, December 5, 1931. Geared turbines. Largest merchant marine ship ever built in U. S. and first built in U. S. for transatlantic service since the 11,629-ton, 21-knot *St. Louis* and her sister, the *St. Paul*, of 1897. Passenger capacity, 1,320. Features: ventilation; air-conditioning, safety with 11 water-tight bulkheads.]

Nel Named, U. S. 30,000 705 x 86 21 oil T2 U. S. NoAt
[Sister of *Manhattan*. Suggested names, *Martini* and *Bronz*. Keel laid at Camden, March, 1931.]

Champlain, French 28,000 641 x 83 20 oil T2 Fr. NoAt
[Launched St. Nazaire, August 15, 1931. Geared turbines. Passenger capacity, 1,092. Expected maiden voyage May, 1932.]

Strathaird, P. & O. — Sister of *Strathnaver*
[Launched Barrow-on-Furness Yards, Vickers, Ltd., July 18, 1931. Due in service February, 1932. These two are largest and fastest British-built turbo-electric vessels, exceeding P. & O.'s *Viceroy of India* by 4,000 tons and at least 4 knots.]

Monterey } Matson — sisters of *Mariposa* { At Quincy Yards
Lurline } { *Monterey* launched October 10, 1931
{ *Lurline* keel laid August, 1931 Shipbuilding Corp.

BY WAY OF COMPARISON

Ten Years Ago: There were 16 merchant vessels afloat capable of 20 knots or better and over 13,000 gross tons. Two were fitted for liquid fuel. The 16, in order of size, were: *Majestic*, *Leviathan*, *Berengaria*, *Olympic*, *Aquitania*, *Paris*, *Mauritania*, *France*, *Kronprinzessin Cecilie* (19,503), *Kaiser Wilhelm II* (19,360), *Oceanic* (17,274), *Kronprinz Wilhelm* (14,908), *Kaiser Wilhelm der Grosse* (14,349), *Empress of Britain* (built in 1906, 14,189 tons, or about a third the size of the present vessel bearing this name), *Empress of Ireland* (14,191), *La Provence* (13,753), *Shinyo Maru* (13,500), *Tenyo Maru* (13,454), *Chiyo Maru* (13,426), *Shinyo Maru* and *Tenyo Maru* were still in service in 1931 but were then rated as 16-knot ships.

Twenty Years Ago: There were 16 merchant vessels afloat capable of 20 knots or better and over 13,000 gross tons. Two were fitted for liquid fuel. The 16, in order of size, were: *Olympic*, *Titanic* (45,000), *Mauritania*, *Lusitania* (31,000), *France*, *Kronprinzessin Cecilie* (19,503), *Kaiser Wilhelm II* (19,360), *Oceanic* (17,274), *Kronprinz Wilhelm* (14,908), *Kaiser Wilhelm der Grosse* (14,349), *Empress of Britain* (built in 1906, 14,189 tons, or about a third the size of the present vessel bearing this name), *Empress of Ireland* (14,191), *La Provence* (13,753), *Shinyo Maru* (13,500), *Tenyo Maru* (13,454), *Chiyo Maru* (13,426), *Shinyo Maru* and *Tenyo Maru* were still in service in 1931 but were then rated as 16-knot ships.

Thirty Years Ago: There were 5 merchant vessels afloat (or building) capable of 20 knots or better and over 13,000 gross tons. The largest was the *Kaiser Wilhelm II* and the remaining four, in order of size, were: *Oceanic*, *Deutschland* (16,502), *Kronprinz Wilhelm*, *Kaiser Wilhelm der Grosse*.

* "Oil" indicates fitted for liquid fuel; "m. s.," motorship; "coal," uses coal for fuel; "T," turbines; "2," twin screws; "3," triple screws; "4," quadruple screws.

** "NoAt" indicates North Atlantic, European to U. S. and Canadian ports; "SoAt," South Atlantic, European to South American ports; "NoPac," North Pacific, Canadian and U. S. to Hawaiian, Asiatic and/or Philippine ports; "LoAus," London to Australian ports; "NYBer," New York to Bermuda; "CalAus," Californian to Australian ports.



Industrial Disequilibrium

The True Cause of Business Depressions

BY RALPH E. FREEMAN

THE recent revival of astrology under the influence of radio broadcasting furnishes another interesting example of the fact that popular fallacies die hard. In spite of the spread of scientific information and the popularizing of science in modern literature, many people still cling to the belief that the destiny of the individual human being is profoundly influenced by the appearance and arrangement of the stars. A similar persistence is noticeable in regard to economic fallacies. Notwithstanding the expenditure of large sums of money for the teaching of social sciences in our schools and colleges, economic doctrines remain alive which have for many years been condemned by the practically unanimous voice of leading economic authorities. This latter type of fallacy is the more dangerous. The present craze for horoscopes is not likely to undermine the morals of the community or to offer serious hindrance to the advancement of science; but adherence to discredited economic theories may place formidable obstacles in the way of social progress. So long as large numbers of people, among them political and industrial leaders, continue to accept erroneous or superficial explanations for our industrial ills, the proper remedies for these ills will be exceedingly difficult or impossible of application.

There is, for example, the widely held opinion that the existing depression is due to a general overproduction of goods, when the truth of the matter is that the appalling surpluses keeping prices low and men out of work are effects rather than causes. Glutted markets and the accumulation of large stocks of commodities almost invariably appear after the business crisis, and not before. Statistics confirm this view. Mr. Carl Snyder's paper, read before the 1931 meeting of the American Economic Association, disclosed the rather astonishing fact that during the years immediately preceding the crisis of 1929, the output of basic goods was actually smaller than in previous years when no depression occurred. Now, if the source of industrial dislocation lies in the output of too many goods of all kinds, the obvious remedy is to cut down output, or to increase the purchasing power of the consuming public in conformity with the increase of productive capacity. But since the diagnosis is wrong, the remedy will be ineffective. We waste our energies searching for ways and means to remove the consequences of disease rather than its causes. Economic physicians tell us that the world is suffering, not from over-eating, but from an unbalanced diet, and that, if we prescribe for the former ailment, we may starve the patient.

Perhaps the situation can be explained more clearly by the use of a mechanical analogy. Our industrial system is like an airplane which works with greatest efficiency when kept in a state of equilibrium. The latter is held steady under the combined forces of its weight, the power of its engine, and the resistance of the air. While these forces retain their relative values the machine will maintain its progress in horizontal line; but as soon as any one of them changes, the equilibrium is affected and the machine will rise or fall. Though the effect of such changes may be counteracted by balancing devices to promote lateral and longitudinal stability, the principle remains the same; equilibrium is realized when the speed due to motive power is sufficient for the thrust exerted by gaseous molecules gliding under the surfaces of the plane to hold it steady in the air. Should there be a stoppage of the motor or an impairment of the carrying surfaces, the machine would be compelled to come down and its efficiency as an aerial vehicle would be interrupted. Our economic system is in perfect equilibrium when the right amount of each commodity is being produced. The production of one article creates a demand for others. When the furniture industry expands, its manual workers, salesmen, directing officers, shareholders, and the rest who participate in the monetary returns from the sale of furniture are enabled to buy more things than before. This evokes the production of more automobiles, food, clothing, and other commodities. What is true of furniture is also true of hardware,

confectionery, gasoline, cosmetics, boots and shoes, and so forth; expansion in one line of business creates a demand for expansion in other lines. But this demand will not be exerted with an even pressure throughout the whole system. The stimulus arising from an increase in the textile industry, for example, will not be felt with equal force in all the others. It depends upon how the men and women in the textile industry choose to spend their incomes. If they prefer radios to new clothes, or books to theater tickets, the radio and printing industries will experience a greater urge to expansion than the clothing or theater industries. Each branch of production, whether of goods or services, must develop an appropriate response to the expressed desires of consumers. Only by this means can the equilibrium of the industrial system be maintained.

Of course, some part of the income created by the growth of the textile business would be saved, either as reinvested earnings by corporations or by individuals in the form of investments and bank accounts. These funds would be devoted to the purchase of industrial materials and equipment or loaned to business concerns for maintenance or expansion purposes. If the savings of society were not devoted to uses of this nature, our productive apparatus would soon run down and the habit of saving would be discouraged by the decline and disappearance of interest. Therefore, the stimulus resulting from the expansion of an industry is certain to be felt not only by the producers of goods for immediate consumption, but also by the makers of machinery and the other necessary aids to production. The various branches of the equipment industry will be influenced according to the demand for this or that type of machine, while farmers, miners, and others engaged in the production of raw materials will be induced to expand their operations in answer to the needs of other industries for their particular products. A balance must be maintained between consumers' and producers' goods and between the various types of producers' goods. As soon as we begin to devote too large a proportion of our resources to the production of one article, we disturb the equilibrium of the system.

It is not a question of general overproduction, but of disproportionate production — not too much of everything, but too much of one or a group of things in relation to the amounts of the others. A large airplane may be flown as safely as a small one. If the weight is right in proportion to the resistance of the air and the power of the engine, the machine will be stable. But if the engine or cargo is too heavy, if the spread of the planes is insufficient, there is likely to be trouble in the navigation of the vehicle. The same is true of an individual business concern; a billion dollar company may be operated as efficiently as one of relatively meager assets.

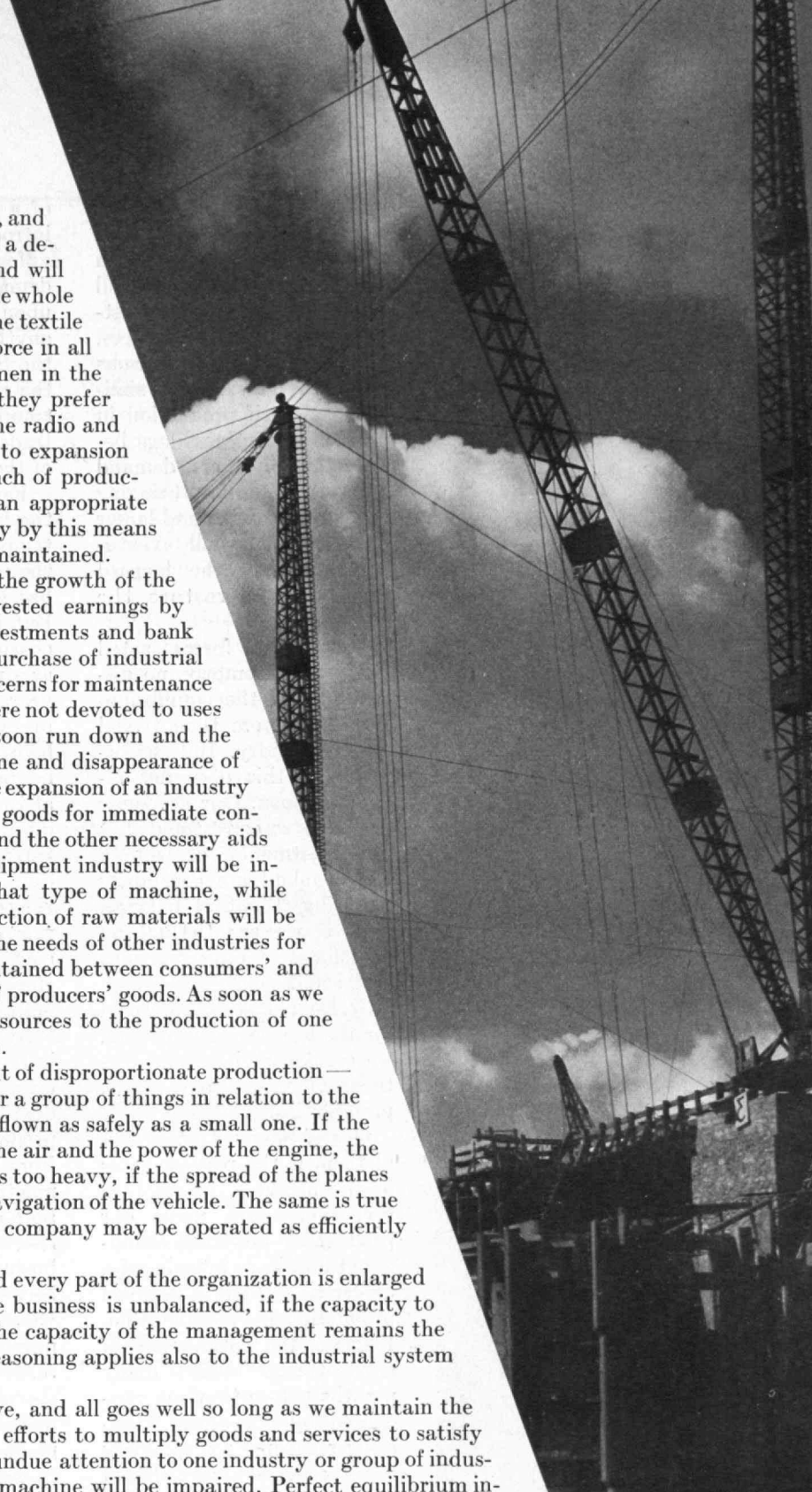
Expansion is not likely to be dangerous provided every part of the organization is enlarged in the right proportion; but if the growth of the business is unbalanced, if the capacity to turn out goods, for example, is increased while the capacity of the management remains the same, the result may be disastrous. The same reasoning applies also to the industrial system as a whole.

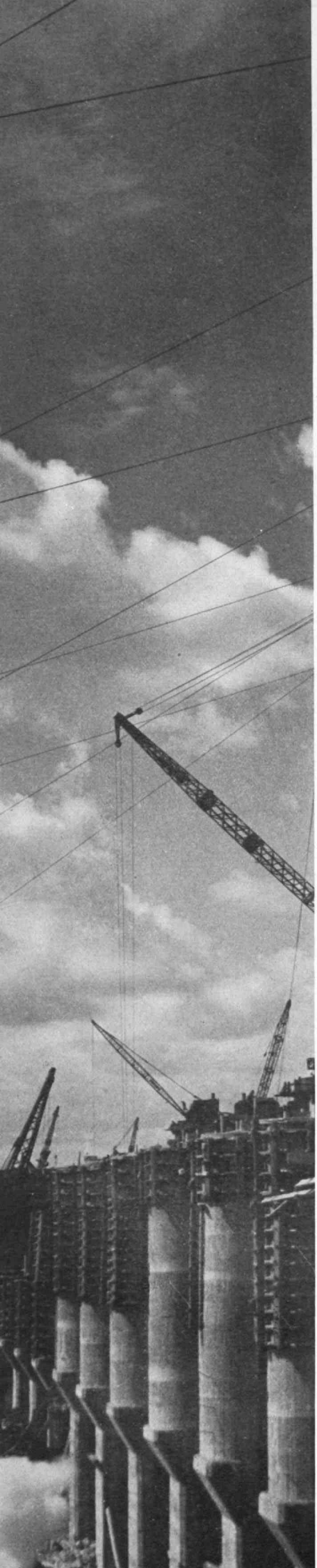
We strive to make it more and more productive, and all goes well so long as we maintain the proper balance of its various parts. But if, in our efforts to multiply goods and services to satisfy the ever-increasing wants of mankind, we give undue attention to one industry or group of industries, the efficiency of our great want-satisfying machine will be impaired. Perfect equilibrium involves the production of the right amount of each commodity and service.

What is the "right" amount in each case and how is it to be determined? Under the Soviet régime the managers of business do not have to worry about questions of this kind, for the state planning authorities assign to each industry and to each plant a definite quota of output.

But under our competitive system there are no planning boards to which we can apply for information of this character; the control of production is carried out by the market forces of demand and supply. The "right" amount of a particular commodity is being produced when these forces bear such a relationship to each other that a price emerges which is just high enough to encourage the producers to carry on. But when one industry expands disproportionately, the demand for its products (which comes chiefly from persons engaged in other industries) fails to keep pace with the increased supply. The price then tends to fall below a

OVERPRODUCTION AN EFFECT, NOT A CAUSE





profitable level and production will be curtailed. In this way, the overexpansion which caused the trouble will be corrected. The readjustment may, in some instances, be effected before serious damage is done. And, in similar fashion, if production in one line of business lags behind that of others, demand will outrun supply, bringing an increased price and larger profits, which will eventually stimulate the laggard industry and restore the equilibrium.

If market forces acted freely and promptly, no disturbance of the equilibrium would be more than trivial and temporary. But, unfortunately, this does not always happen. Our economic system is so constituted that maladjustments of supply and demand are constantly throwing it out of balance, and, if we are to find an explanation for the reactions and counter-reactions which have been shaking the world for the last century or more, we must examine those features of the system which promote instability.

One of the most important of them is the pervasiveness of the machine. Mechanical inventions have made our productive methods roundabout and have introduced a longer time interval between production and consumption. Because the production of most things begins many months before they are purchased by consumers, decisions regarding the quantity to be produced must be based upon estimates of what the demand will be. These estimates, no matter how carefully prepared, are certain to be wrong in many instances, with the result that the supply is either too large or too small in relation to the demand which ultimately develops.

What people want and how much they want is always changing. The outbreak

of a war, unexpected weather, whims of fashion, the introduction of substitutes—any one of a score of unforeseen events may suddenly alter the character of demand. Moreover, since the volume of output depends upon anticipation of demand, it will be affected by anything that influences the producer's attitude toward the future; and, because the psychological character of the crowd imposes itself upon the individual with extraordinary force and rapidity, a general opinion that trade is declining or improving will mar the estimates of the most hard-headed of business men.

Failure to anticipate demand correctly is often due to the fact that it is subject to stimulating influences of a temporary character. The extension since the war of the practice of buying goods on partial payment plans has greatly enlarged the consumer's capacity to buy. But installment buying as a source of increased purchasing power is bound to fail sooner or later. As soon as a man has spent his income in advance for the next year or two, the best he can do thereafter is to maintain his existing level of expenditure. Unless his income rises, he can no longer buy at an increasing rate. If it should happen that many consumers reach this saturation point at the same or nearly the same time, the sudden falling off in demand would be a serious blow to the manufacturers of furniture, automobiles, radios, and other durable goods of this kind. Then, if in addition to this, the confidence of the community in the maintenance of prosperity should be shaken, consumers, instead of continuing to buy on time, would cut down their purchases and turn to paying their debts. This would make matters still worse.

Another source of temporary demand is to be found in the expansion of bank credit. When the general price level is rising, or (as has happened since the War) production costs are falling, the prospect of increased profits induces business men to borrow more freely from the banks. This credit becomes the basis of augmented purchasing power and may lead to higher prices both of goods and of securities. If the commodity prices rise, speculators buy to hold for an increase in price and business men are willing to purchase and store freely because of the profits to be made out of increases in the value of inventory. If security prices rise and a stock market boom develops, the demand for goods will be further enhanced by the prodigality of successful speculators. The result is a tremendous expansion of business and many concerns begin to build additional plant and add to their productive capacity. But these causes of demand stimulation are transitory. When they disappear, certain industries, especially those engaged in making luxury articles and equipment, find themselves badly out of balance with the rest of the economic world.

But the preservation of a perfect equilibrium involves something more than a correct analysis of the market; it requires also a prompt reaction on the part of producers to changes in the character and extent of the market. Here again we fall far short of perfection. The economic machine does not operate without delay and friction. Our productive resources do not move with sufficient rapidity from one industry to another in response to changes in demand. (*Continued on page 186*)

THE TREND OF AFFAIRS

IN THIS SECTION: *Making Trains Comfortably Cool in the Summer Time* (174); *Taking Photographs in the Dark* (175); *A Flying Laboratory* (176); *A Machine to Do the Menial Mental Work of Science and Engineering* (171); *Penetrating the Depths of the Sea* (172); *The Longest Concrete Arch* (173).

Brain Servant

SINCE WATT contrived his wheezy steam engine and Faraday showed how to put electricity to work, man has progressed remarkably in the transfer of physical labor to machines. The next profoundly important advance in the mechanization process, and one that was suggested by Leibniz more than 200 years ago, is the relegation to machines of those mental processes which are inherently mechanical, repetitive, and time-consuming. Such a statement sounds fantastic until one recalls the extent to which mechanical computation has already revolutionized business accounting methods.

But most business computations are simple and elementary and by no means represent the possible achievements of machine thinking. The scientist, the engineer, and the statistician are seeking means to the mechanical solution of equations more complex than profound, which require onerous computation and a waste of valuable time. In short, they, too, need brain servants to do the menial part of thinking.

At M.I.T. a program has been mapped for supplying labor-saving, analyzing devices. Two machines, the product integrator and the photoelectric integrator, have been built and made available for use. And now a third, the most complicated and ingenious of all, the differential analyzer, is announced. The first of these machines, the forerunner of the last, has been used for solving second order, differential equations. The second gives an approach to the integral equation and to certain processes of statistical analysis. The differential analyzer, which has been called one of the most intricate machines ever built, also deals with the differential equation, for which it provides solutions in the form of plotted curves for specified, boundary conditions. It is being used for the solution of these equations of any order up to the sixth and of any amount of complexity within reason.

Professor Vannevar Bush, '16, who developed the analyzer, states that it is readily possible when plates have been made and a schematic diagram giving schedules and connections prepared, to set up the machine

for a given problem in a few hours. "The time necessary for solutions varies with the complexity of the problem and the precision desired and in representative cases is about ten minutes for each solution corresponding to a given set of boundary conditions. Experience is necessary, of course, in order to use the device effectively. This is actually one of the most attractive aspects of the machine; one acquires an entirely new appreciation of the innate nature of a differential equation as that experience is gained." Aside from its

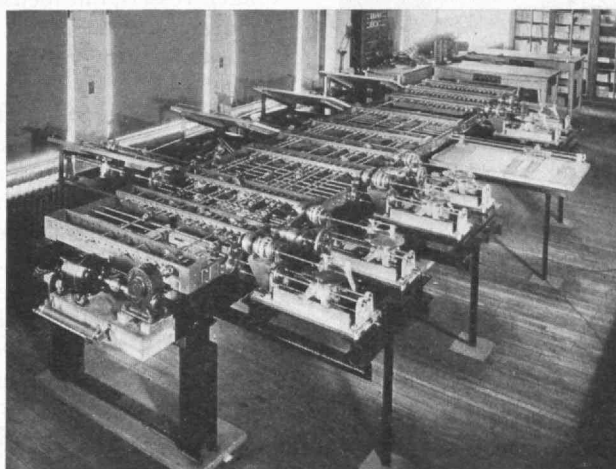
mechanical gifts, the differential analyzer is a triumph of machine design. Methods have been incorporated for eliminating backlash, particularly a device called a "frontlash" unit.

It will be noted from the adjacent photograph that there are provided 18 longitudinal or bus shafts and that these can be readily uncoupled at many points. Along the sides of the device are arranged the main units, the integrators, input tables, multipliers, and output table, each connected to cross shafts.

The analyzer incorporates the basic idea of an interconnection of integrating units and one of its notable features is the addition of mechanical torque multipliers, which render the integrating units capable of carrying a considerable load. Large size has been preserved in order to obtain accuracy of plotting of the variable coefficients and of the result. Various auxiliary units such as multipliers have been provided. A precision of one part in three or four thousand has been arrived at with the intention of achieving a somewhat less overall precision. Except in extraordinary circumstances, all main operations are mechanical with electrical devices used only for drives and controls.

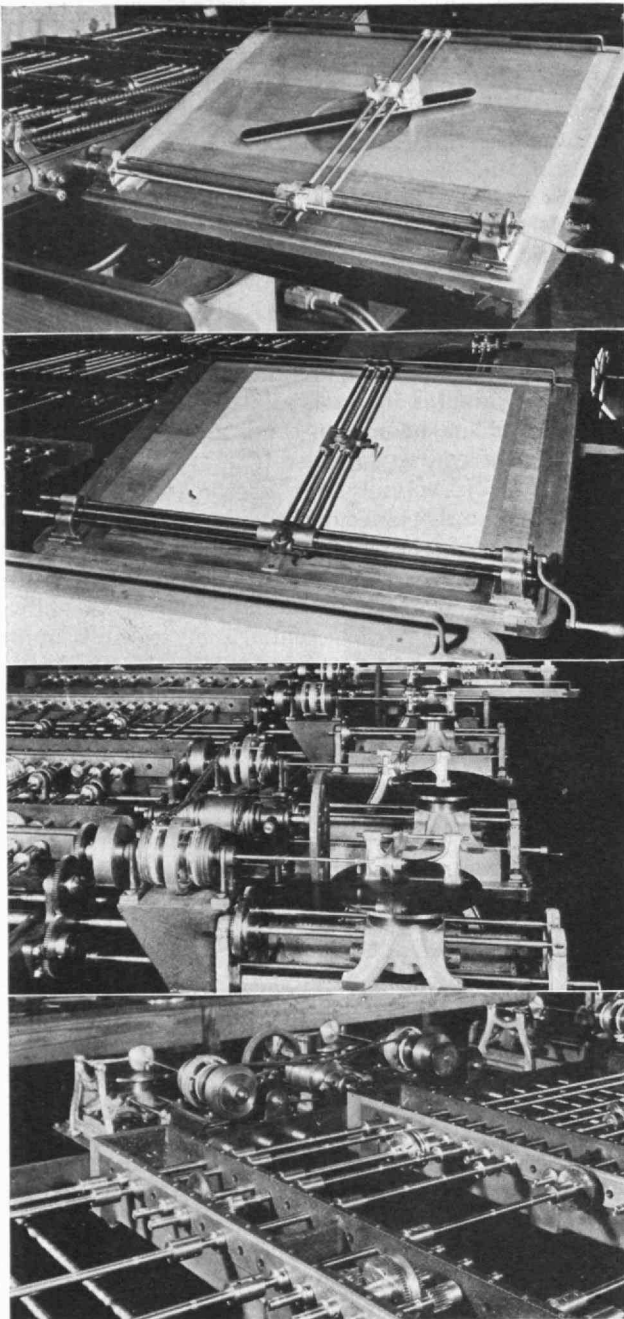
The differential analyzer so far represents man's greatest achievement in building machines to aid him to do the servant work of thinking. Professor Bush, who has supervised the development of all three machines here at the Institute, envisions still other and more versatile machines.

The status of physics and engineering at the present time, Dr. Bush has pointed out, is peculiarly favorable to developments of this sort. "Electrical engineering, for example, having dealt with substan-



M. I. T. Photo

A brain servant to do the menial part of engineering thinking: the differential analyzer described adjacently



M. J. T. Photos

From top to bottom: 1. A multiplier of the differential analyzer. 2. An input table. 3. An integrator connected with a torque amplifier. 4. Longitudinal shafts and frontlash units.

tially linear networks throughout the greater part of its history, is now rapidly introducing into these networks elements, the non-linearity of which is their salient feature, and is baffled by the mathematics thus presented and requiring solution. . . .

"Not any one machine, nor even any one program of development can meet these needs. It was a long, hard road from the adding machine of Pascal to the perforated card accounting machines of the present day. There must be much of labor and many struggles before the full ideal of Leibniz can be consummated."*

*"The Differential Analyzer. A New Machine for Solving Differential Equations." *The Journal of the Franklin Institute*, Vol. 212, No. 4, Oct. 1931.

Down Below

SUBMARINE disasters and the age-old lure of sunken treasure have hastened the development of deep-sea diving apparatus within recent years. The old-fashioned diving suit of fabric and rubber, adequate, if not wholly efficient at depths of less than 50 feet, is of comparatively little use and even dangerous below 100 feet.

Diving operations have increased with the progress of engineering in the construction of bridges, dams, and harbor works, but the conventional diving suit in most instances met all requirements in this work. To the marine engineer, the admiralty expert, and the salvage engineer, facing the inexorable demands of disaster, must go the chief credit for recent progress in diving operations at great depths.

The loss of the United States submarines *S-51* and *S-4* off the Atlantic coast a few years ago not only showed the need for new safety devices for escape from sunken vessels, but focused public as well as professional attention on the serious need for more efficient diving apparatus. Both vessels lay more than 100 feet below the surface.

Man's desire to penetrate the depths of the sea is not new. Divers are said to have been employed to clear underwater barriers erected to damage Grecian ships at the siege of Syracuse, and history relates that Alexander the Great ordered divers to destroy undersea defenses of the besieged at Tyre.

Among the early devices for diving was a crude form of the diving bell under which men worked for brief periods until the enclosed supply of air was exhausted. Later came the simple tube, one end of which the diver held in his mouth while the other end was supported above the surface by an inflated bladder. Alexander the Great himself is said to have once descended into the sea in a device called a Colimpha, the form of which is not known.

Roger Bacon is reported to have invented a diving bell in 1250, but there is no authentic evidence to indicate the nature of the device. In 1715 John Lethbridge, an Englishman, developed a leather diving suit which held "half a hogshead" of air, which was sufficient for brief underwater operations. The inventor is said to have made a fortune from the device.

Augustus Siebe might well be called the father of modern diving, the genius of submarine tailoring. In 1819 he invented an open diving suit, fitted with a metal helmet and supplied with air under pressure, which kept out water as long as the diver remained upright. The principle was the same as that by which the diving bell operates. Later he improved his suit by closing it entirely and providing an air supply by hose to the helmet. An exhaust valve permitted it to escape. The present-day, conventional diving suit is but an improved model of Siebe's second design.

In order to penetrate the great depths where the pressure is high, the diver who uses the conventional suit of fabric and rubber must be subjected to an air pressure equal to that of water in which he works. It is in this high air pressure within the diving suit that one of the great hazards of undersea operations lies.

Whatever the air pressure is within the suit, it is transmitted to the body of the wearer, being distributed to the tissues and blood vessels, which become saturated with nitrogen. This is due to the fact that a gas in contact with a liquid on which has it no chemical action is absorbed by that liquid.

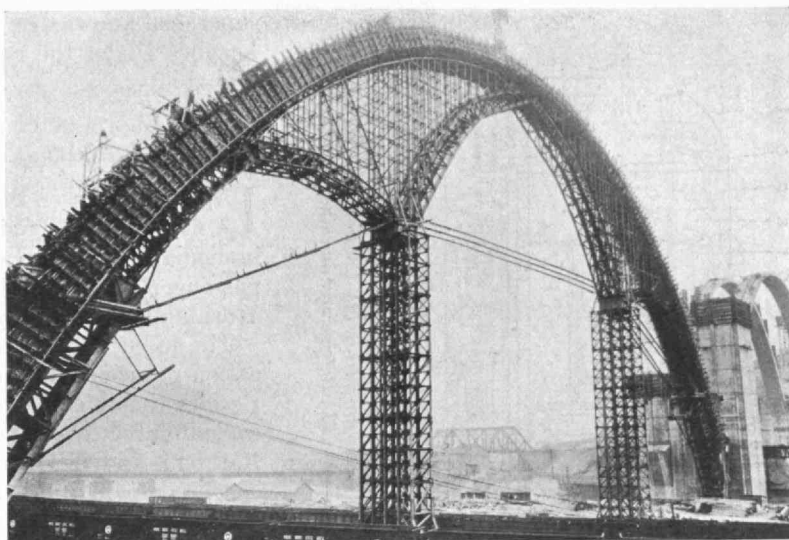
The fact that the diver's body becomes saturated with nitrogen has no ill effect until he begins to ascend. The reaction then is exactly the same as when a cap is removed from a bottle of carbonated water and gas bubbles to the surface. The nitrogen bubbles in the blood stream and, unless the diver is raised very slowly, this process becomes so rapid that it causes great pain in the muscles and joints, and produces what is known to the diving profession as "bends." In extreme cases it causes death. For this reason divers must ascend very slowly, and for their welfare modern diving operations require that they be placed in decompression chambers as soon as they reach the surface. In these chambers divers are slowly accustomed to normal atmospheric pressure.

Thus it will be seen that diving under high air pressures makes operations both slow and hazardous. The ideal for a diving suit, then, is a device in which the diver may be supplied with air at normal pressure, regardless of the depth at which he works. Several armored diving suits designed to withstand the pressures in deep water have already been developed and successfully used. Another improvement in more recent diving apparatus of this type is a self-contained supply of air carried in tanks attached to the suit. This innovation does away with the necessity of supplying air through a hose from the tender-ship, and makes it much easier for the diver to move about on the bed of the sea. In devices of this type the only connections between the diver and his ship are a light lifeline, telephone, and electric light cables.

A few years ago Professor Elihu Thomson, Life Member of the Institute's Corporation, suggested that helium gas be used in the place of nitrogen in the atmosphere supplied to divers in deep-water operations. Helium has a solubility in water nearly 40% less than nitrogen, and in exposure to compressed air nearly 40% less gas will be dissolved in the watery parts of the body. Helium also will escape from the lungs much more quickly than nitrogen during the decompression period and thus the diver may ascend faster. Experiments with the mixture suggested by Dr. Thomson have proved successful.

Divers working in rescue operations on the submarine *F-4*, which sank off Honolulu several years ago, reached the unprecedented depth of 275 feet in ordinary diving suits. This heroic work was slow and arduous, and the greatest care was necessary in the decompression of the men.

The first of the self-contained diving suits was developed by H. A. Fleuss about 50 years ago. Later he and R. H. Davis designed another suit providing air by means of regenerating drums. This was the first



Wide World

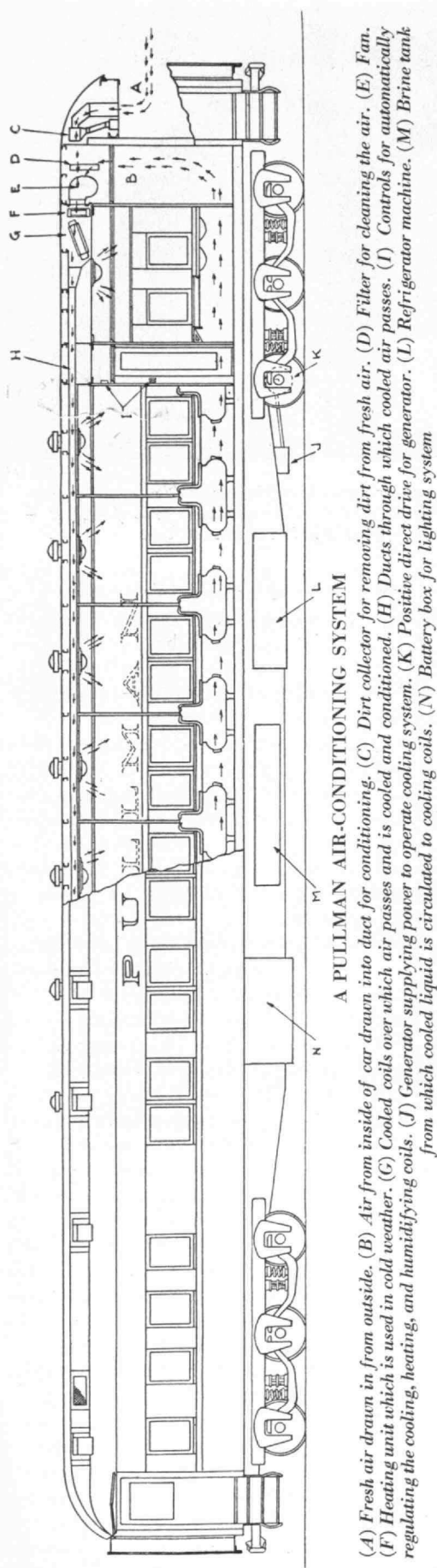
Building the George Westinghouse bridge in East Pittsburgh. The new bridge consists of five reinforced concrete arches, the central arch having a span of 460 feet — the longest concrete arch yet built in the United States

time that a diver had been entirely independent of a supply of air from the surface. A device on this early suit caused the air which had been breathed to pass through caustic soda, which took up the carbonic acid and thus purified it. In this suit a diver found it possible to reach a depth of 150 feet.

The most recent of diving chambers, for these devices are chambers rather than suits, are built of steel or of steel and aluminum. Some of them have huge, flexible joints and most of them carry their own independent air supply. Divers working in these chambers breathe air at normal atmospheric pressure, may be raised and lowered quickly, and suffer none of the ill effects produced by high pressures.

The divers now working to recover the \$5,000,000 in gold which lies in the *S. S. Egypt*, sunk off the coast of France in 1922, are working regularly at a depth of 396 feet. Two types of diving chambers are being used in this undertaking, which is being carried out from the Italian salvage ship, *Artiglio II*. One is simply a steel observation shell fitted with heavy windows from which a diver may direct operations by telephone. The other is a huge metal chamber with jointed arms and legs. In this type the diver, operating steel pincers at the ends of the arms, can aid in the underwater work.

The descent to the *S. S. Egypt*, while the greatest for actual salvage operations, is not the furthestmost depth to which man has descended into the sea. William Beebe, the undersea explorer, designed a steel sphere equipped with heavy glass windows in which he was lowered to a depth of 1,400 feet for the purpose of studying the fishes and flora of the South Atlantic. Beebe's sphere has been used regularly for observations and photography at depths of more than 400 feet. These recent developments but indicate the possibilities for future progress in exploration and salvage on the bed of the ocean. What has already been accomplished seems to open the way for still further improvements which will make it possible to do useful work in the unplumbed depths of which man has but a



(A) Fresh air drawn in from outside. (B) Air from inside of car drawn into duct for conditioning. (C) Dirt collector for removing dirt from fresh air. (D) Filter for cleaning the air. (E) Fan. (F) Heating unit which is used in cold weather. (G) Cooled coils over which air passes and is cooled and conditioned. (H) Ducts through which cooled air passes. (I) Controls for automatically regulating the cooling, heating, and humidifying coils. (J) Generator supplying power to operate cooling systems. (K) Positive direct drive for generator. (L) Refrigerator machine. (M) Brine tank from which cooled liquid is circulated to cooling coils. (N) Battery box for lighting system.

superficial knowledge. Fulfillment of Jules Verne's vision of "20,000 Leagues Under the Sea" has already come within the compass of probability.

Train Comfort

LAST spring when the Baltimore and Ohio Railroad introduced the first completely air-conditioned train, the public's response was immediate and convincing. Executives of the railroad reported that passenger traffic on the air-cooled train (the *Columbian*, between Washington and Jersey City (New York)) increased 600%.

The success of this venture points definitely to a widespread application of air-conditioning systems to railway passenger equipment. Besides the 46 cars equipped by the B. & O. last summer, five air-cooled dining cars have been placed in service by the Pennsylvania Railroad, and the Boston and Maine, experimenting with one day coach completed in September, found it so popular that parlor-car passengers forsook their Pullman chairs to crowd into the ice-cooled coach. The London and North Eastern Railway is apparently following suit, having announced the installation of combination heating and cooling systems on carriages for certain first-class trains, and at the Colonial Exposition in Paris this summer, the Paris-Orleans Railroad Company exhibited second-class car number B⁹y fi 5078 equipped with an air-cooling plant.

Although little has been said about it, the Pullman Company has also built air-conditioned cars, and they are now being tested in all parts of the country. Three systems are being tried by the company: (1) with mechanical refrigeration (similar to that used by the B. & O.); (2) with ice as the cooling agent (used by the B. & M.); (3) with a water-spray device. It has also begun experiments with a steam-jet system. In fact, the method of cooling cars by steam seems one of the most promising. The Carrier Engineering Corporation has demonstrated a steam-vacuum cooling method, and reports that the steam requirement for cooling the car in summer is considerably less than that needed in winter for heating. It is claimed, therefore, that the locomotive steam load is not increased.

It would be a difficult and dangerous thing, however, to discriminate with respect to these various systems at the present time. Each has its own vociferous protagonists, and doubtless each has its own peculiar advantages. It would seem reasonable, nevertheless, that those systems which can circulate warm, clean, conditioned air in winter as well as cool air in the summer will be the most practical because of their all-year-round usefulness.

The following temperature reductions reported for various cooled cars indicate the results obtained by the various systems:

	Outside temperature	Temp. of non-cooled cars	Temp. when cooled
Paris-Orleans Railway...	93.2° F.	95°	83.3°
Pullman Jacksonville...	104°	99°	82°

The B. & M. reported that conditions in its coach on September 9 and 10 were maintained at an inside temperature of 12° to 14° below the outside temperature and 14° to 19° cooler than conditions existing in other cars on the train.

The mere fact that it is feasible to supply a railway car with an air-conditioning plant is remarkable enough, especially when it is recalled how bulky and space-consuming such systems are in buildings. More remarkable still is the fact that light, compact systems are being designed which will operate so economically that they will add little to the cost of traveling. The art of air-conditioning is just coming into its own, and the next few years will see an enormous multiplication of its uses, not the least of which will be the widespread air-conditioning of residences.

A Glass Eye Sees New Horizons

INFRARED photography, which has made it possible for the camera to see and register images by light invisible to the eye, is literally extending the horizon in long-distance photography. Photographic plates sensitive to the long light waves in the infrared region of the spectrum were made as early as 1870, but modern research has developed dyes which open new opportunities in this branch of photography.

With the new infrared-sensitive plates it is now possible to photograph mountains and cities hundreds of miles away and entirely hidden from human vision by the blanket of haze which hangs above the earth. This atmospheric barrier, impenetrable to visible light waves, has only a slight effect on the penetration of the infrared waves. Astronomers welcome this new development in photography as an aid to the study of celestial bodies, and there is every indication that it will have important commercial applications.

Spurred to intensive research by the approach of an important astronomical event, Captain W. de W. Abney, an English army engineer, developed in 1870 a photographic emulsion that was sensitive to infrared light. It was made especially for the British astronomical expeditions which set out to witness the transit of Venus in 1874, and proved successful. Abney's formula, however, has never been reproduced, so far as known. The dyes now used in the infrared emulsions are of modern origin, and more efficient than those used by this earnest worker of 60 years ago. The excellence of Abney's emulsion is indicated, however, by the fact that the limits to which he extended the vision of the photographic plate were not again reached until 1926, when the dye neocyanin was found to be sensitive to light in the infrared region of the spectrum. The first major astronomical feat with color-sensitive plates was a map of the infrared region of the solar spectrum, made by Abney soon after he had worked out the formula of his emulsion.

The recent developments in infrared photography concern emulsions which make possible photographs at very short exposures. Infrared sensitive plates requiring long exposures have been used by astronomers for some years to photograph the spectra of bright stars. The production of more sensitive plates is expected to make possible studies of stars which are either so far away or give off so little light that the old form of plate will not register them.

A decade ago photographs of the Yosemite Valley were made from Mt. Hamilton in California, a distance of 120 miles. The plates used in this experiment were sensitive to infrared rays which, however, were comparatively near the visible spectrum.

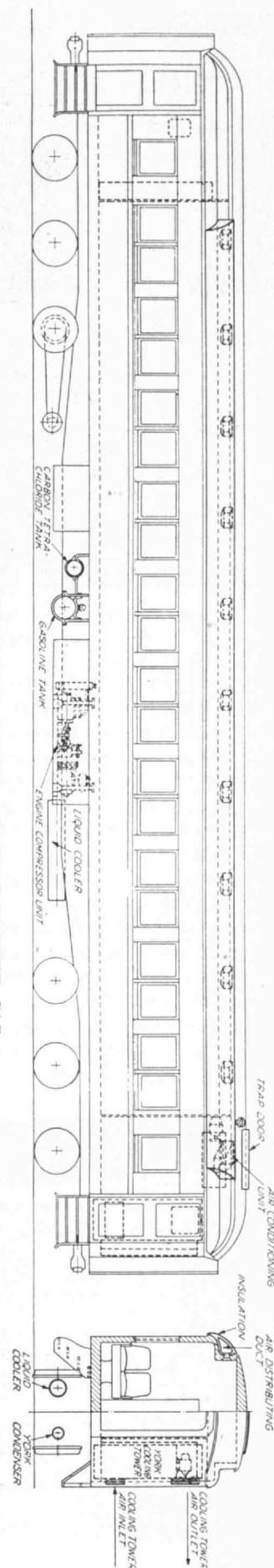
The most spectacular evidence of the possibilities in this field of photography are the photographs made by Captain A. W. Stevens, head of the photographic branch of the United States Army Air Corps. As early as 1929, Captain Stevens made a photograph of Mt. Ranier from an airplane 227 miles from the snow-capped peak (reproduced in *The Review* for January, 1930). This photograph was a "blind shot" because the eye of the observer could not penetrate the haze present in the atmosphere at all times. Captain Stevens made the photograph by compass bearing and the result was a clear-cut picture of the Cascade Range and Mt. Ranier.

Since that time Captain Stevens has made a photograph in South America clearly showing the great Andean peak of Aconcagua at a distance of 310 miles from the camera's lens. In this remarkable photograph the line of haze over the pampas is curved, indicating the form of the earth, and it may be said that for photography of this type the only limit to the range of the camera is that fixed by the curvature of the earth. It would be quite possible on a clear day to make a photograph of the City of Detroit from an airplane flying at an altitude of 20,000 feet above Dayton, Ohio.

Infrared photographs are taken by placing a color filter over the lens so that the visible light, so necessary in other forms of photography, is entirely absorbed. Only the invisible waves of the infrared pass through the lens.

It will be noticed that the compressor is driven by a gasoline engine suspended beneath the car. It is estimated that the increased cost per passenger of air-conditioning amounts to approximately 20¢ per day. Application of air-conditioning equipment to trains presages its use on steamships—in fact the first-class dining room of the Matson liner MAURO, described on page 167, is air-conditioned. In a forthcoming issue of The Review the air-conditioning of residences will be treated at length.

A BALTIMORE & OHIO AIR-CONDITIONED CAR





Eastman Kodak Company

Photograph taken with infrared light. To the human eye the room was completely dark. As described below the group photographed was made up of members of the National Research Council's tour of industrial laboratories

Recently Dr. C. E. K. Mees, Director of the Eastman Kodak Research Laboratory, demonstrated that it was possible to take a photograph in complete darkness. This was accomplished by placing 16, 1,000-watt electric lamps in a booth provided with a filter which permitted only the infrared light to pass. The special infrared sensitive plate used for this photograph was hypersensitized with ammonia and the exposure was one second. The group in this photograph included President Compton and Professor Dugald C. Jackson, Head of the Department of Electrical Engineering, who were members of the National Research Council's tour of laboratories.

Infrared photographs are of somewhat different appearance from the conventional picture. The sky, usually blue in nature, appears dark in the infrared photograph because sky light contains very little infrared. Foliage in direct sunlight reflects infrared

strongly and therefore appears almost white, although detail is not necessarily lost. The reason that infrared light makes it possible to take photographs at great distances is that light of this wave length, which is much longer than the waves of visible light, is not easily scattered by haze or dust. Visible light, which is rich in blue, however, is quickly scattered by dust or moisture particles. This fact has already led to studies of the penetrating power of infrared light in heavy fog, a field which holds much promise.

As *The Review* goes to press an announcement comes from Dr. ("Eastman Kodak") Mees that photographic plates sensitive to ultraviolet light, at the other end of the spectrum from infrared, will shortly be made commercially.



M. I. T. Photos

Above: M. I. T. flying laboratory, which is being used in a program of research to develop new knowledge for weather forecasting. Under the left wing of the plane may be seen the meteorograph, an instrument for automatically and continuously recording temperature, barometric pressure, and relative humidity. Left: Associate Professor C. G. A. Rossby in charge of the Institute's work in Meteorology, Dr. K. O. Lange, in charge of the flying laboratory, and Associate Professor Daniel C. Sayre, '23, who pilots the plane in daily flights to a height of more than 17,000 feet

TRANSATLANTIC

The Alchemy of Prague

THE name of Prague, like the name of the city of Bagdad, had seemed to me to be the name of an almost legendary place of romance and mystery. The first building to catch the eye when we came out of the hotel was the great pile of stone with a four-cornered dome, which stands in a dominating position at the head of the principal street, *Vaclavski namesti*, and carries across its front in shining gilt letters the legend, Museum Regni Bohemiae, the Museum of the Kingdom of Bohemia. So we were in Bohemia after all, the luscious vintage of Plzen further to prove it.

The capital of Czechoslovakia indeed proved to contain all of the fascinating things that are traditionally associated with it, but we found it also to be a modern city of nearly a million inhabitants, busy with its own affairs and with affairs which matter in the commerce of the world. Two professors of Charles University showed us the sights, professors respectively of chemistry and physics in a university which was founded in 1348. We were driven in an automobile of Czechoslovak manufacture, and we saw many similar cars in the streets. We saw a new large building, in the business section of the city, devoted entirely to Czechoslovak shoes. The owner of the building and manufacturer of the shoes hopes, we were informed, to make the whole world his market. He already supplies shoes to a large part of middle and eastern Europe, and offers serious competition to American manufacturers. The most expensive shoes sell for 100 crowns, or about three dollars.

Traffic signals shone near buildings which had stood for three or four centuries or longer, and Vaclavski namesti at night was as bright as Broadway with colored electric signs of neon, argon, and uranium gas.

We had seen in the New York Public Library the painting, by Vaclav Brožík, which represents Rudolf II, King of Bohemia, visiting the laboratory of his alchemist in the company of the ladies and gentlemen of the court, who constitute a group of interested spectators. The venerable alchemist, John Dee, is demonstrating an experiment while his assistant, Edward Kelley (with a broad-brimmed hat) stands behind his shoulder and wears an expression which suggests that he has deceived the credulous alchemist and, through the alchemist, the King. Rudolf was a great patron of alchemy and of other forms of magic and science. We,

of course, wished to see the places which have figured in the tales about him. We were invited to the theater where, as it happened, we saw him on the stage in a play called "Golem," a satire on a recent novel which deals with the artificial man, Golem, which, or who, is supposed to have been created by the alchemist, Rabbi Levy.

John Dee came to Prague in 1583, a sort of ambassador extraordinary from the court of Queen Elizabeth. He was a learned and distinguished man, entitled to the respect of the King, and was no doubt given a laboratory within the castle itself. He was accompanied to Prague by Edward Kelley, who seems to have been a crook and adventurer, and who succeeded in convincing Dr. Dee that he possessed the secret of the transmutation of the metals. Dee returned to England in 1589, but Kelley died in Bohemia, for he was not successful in demonstrating his alchemical skill to the King. Count Rosenberg offered Kelley more money for his services than Rudolf had been paying him. Kelley left him but Rudolf captured and imprisoned him in the Castle of Krivoklat, about 40 kilometers from Prague near Plzen, under circumstances in which he had abundant leisure for the preparation of gold. Kelley died from injuries received while trying to escape.

Rudolf housed his less important alchemists in a row of little houses which still stand along Gold Alley behind the Castle at Prague. The old alchemical furnaces are now used for cook stoves. The land behind the houses slopes away precipitously to a deep moat. At the ends of the row of houses are towers, parts of the ancient fortifications, which are connected by a covered passageway running along the roofs. The tower which is nearer the Castle is the Hunger Tower, where tortures were inflicted.

The Czechoslovak Technical Museum, which is situated on the hill near the Castle, contains a fine reproduction of an old Bohemian alchemical laboratory.

The exhibit was arranged by Zachar, a brewer of Plzen, who has made a hobby of Bohemian alchemy and has written several books on the subject.

In the play which we saw, Rudolf was supposed to have stolen Golem from Rabbi Levy, but he did not know the formula which would start the artificial man into action or which, if he were in action, would stop him again. Though the language was Czech, many of the incidents were very amusing. In one act the scene was in



An old Bohemian alchemical laboratory as reproduced in the Czechoslovak Technical Museum

the Hunger Tower and the alchemist was tortured by being hung up by his long beard. In the next act, he appeared with his beard trimmed to scarcely a handful. In another scene, the alchemist was barely visible on a darkened stage, tending his fire and muttering magic incantations. He summoned up spirits out of the blackness, for the chorus was dressed in black and invisible costumes which had evidently been streaked with fluorescent paint and the stage was suffused with invisible ultraviolet light, which developed the fluorescence of the designs, producing a weird effect.

Before leaving Prague we visited the old Jewish cemetery, where we paid our respects to the memory of Rabbi Levy. The cemetery has been in use from the Ninth to the Eighteenth Century, a strange place such as Doré might have pictured. Burials have been made five deep, but the stones which marked the earlier burials have been kept on top along with the later stones, and the whole place at present is so closely packed with standing stones that there is hardly foot room between them. Scrawny trees, 10 or 12 feet in height, and leafless at the time of our visit, grow in such space as they can find. A sarcophagus made of slabs of sandstone stands over the grave of Rabbi Levy, its top a sort of pitched roof made of two slabs and its front another slab standing higher than the rest of the structure. Through the space between the two slabs we saw what looked like scraps of waste paper, but were informed that messages to the spirit of the Rabbi had been written upon them. Pebbles had been placed on the top of the front stone in accordance with ancient custom. I added another, but was told that mine would have no efficacy because I had not brought it from America.

TENNEY L. DAVIS

English University Gossip

YOUR correspondent has stuck assiduously to his work at Cambridge University, like a good boy, and finds the appointed time for his letter coming around without any particularly thrilling incidents to report. The present document will, therefore, be devoted to gossip chopped pretty fine, in compensation for which next month's budget of news, gathered together during his peregrinations on the Continent, will be characterized by a plethora of undigested material.

Armistice day has come and gone, and the efforts of the undergraduates to collect money for disabled veterans took the form of a carnival that put me in mind of the late-lamented Technology Circus. After the vanguard of kilted poppy-sellers had extracted the first installment of our contributions at our own doorsteps, we proceeded into the city, to be met at the gate of each college by importunities for largesse in the form of pennies, to be placed in a row on the curbstone. Some of these rows were of surprising extent. There were also dart-throwing contests, fortune-telling booths, scales for weight-guessing, and all the features of the midway of a country fair. The Market Hill was the scene of a bull fight—synthetic—and around the square passed in solemn pomp the equipage of the King of Ruritania, escorted by a local militia armed with golf

clubs. The grave of the dead nineties yielded up its ghost, and pre-Noachian motor cars vied with penny-farthing bicycles and five-passenger tandems. The sums realized were quite considerable, and I, for one, can testify to the centrifugal tendencies of the smaller coinage.

Littlewood's conversation class terminated the other day in a discussion of priority, author's responsibility, and the other personal sides of scientific activity. The question arose of the responsibilities of the author of a fellowship dissertation, written in good faith, and brilliant in execution, who discovers, subsequent to its submission, a ruinous blunder in an early stage of the work. Another matter that came up was that of the withdrawal from publication of a work independently conceived, but anticipated by a paper published after its conception. Here Landau seems to have the most austere code as far as he himself is concerned, and has suppressed papers already in proof. A third point raised was the possibility of concerted log-rolling by a mutual admiration society. It was claimed, I think with justice, that if three well-known mathematicians were to sponsor a hoax by founding a purely fraudulent branch of mathematics, with a logic of its own, they would referee one another's papers in the natural course of events, and the hoax would be completely successful.

Hardy and Littlewood are much struck by the high-brow mathematics used by the Bell Telephone people in the States. It was Campbell's table of Fourier transforms that started Hardy and Titchmarsh on their paper on Self-Reciprocal Functions. This served to renew interest in transformation theory in this country, and the January meeting of the London Mathematical Society is to be devoted to a discussion of the subject. Your correspondent is to open the discussion.

Americans are considerably in evidence about here. Carlitz is doing good work in number theory, our old friend, Watt H. Ingram, formerly of the M. I. T. Mathematics Department, is developing a new theory of electrical machinery, and Bissonette of Trinity College, Hartford, has had brilliant success with his investigations on the effect of light on the sexual cycle of birds and mammals. Millikan's son is working in zoölogy, and his father was here the other day to visit him. Littlewood was showing Carlitz and myself a difficult traverse at the base of one of the pillars in the cloisters under Trinity Library, and there we were standing in the gloom in various undignified attitudes, *sans* coats, when Millikan came along, asking his way to his son's quarters. We didn't know that he was on this side of the world.

I should have gone to Oxford to collect more material for this note, were it not for the fact that mathematical activity at Oxford is at present at a low ebb. With Hardy gone and Titchmarsh not yet arrived, almost all the analysis work is carried on by one man. Of course, Milne's astrophysical work is extremely interesting. He gave us a lecture here, and has developed a two-phase model of a star, that seems to find a niche for most of the observed sorts. G. I. Taylor seemed most enthusiastic.

Your correspondent has been pressed into duty for lectures on Generalized Harmonic Analysis next term, and will be able to report how a Cambridge class appears from across the lecturer's desk.

NORBERT WIENER

VISITING COMMITTEE REPORTS

On the Departments of Architecture and Hygiene

AT the request of the Executive Committee of the M. I. T. Corporation, The Review publishes as they are released the reports of the Visiting and Advisory Committees on the several departments of the Institute.

Visiting Committees, by way of explanation, are composed entirely of members of the Corporation itself, and it is their function to contribute to the understanding and coöperation existing between the Corporation and Faculty. Advisory Committees have as their membership not only Corporation members but leaders in technology and industry not otherwise connected with the Institute. These Advisory Committees affect a liaison between outside industry and the teaching and administrative staffs of the Institute.

Last month The Review presented a combined Visiting and Advisory Committee Report on the Department of Electrical Engineering. Below are presented two Visiting Committee Reports, the first on the Department of Architecture, the second on the Department of Hygiene and the Infirmary.

The Department of Architecture

WITH Professor Emerson absent for the entire year [1930-1931] from the school on his sabbatical, the Department has been in charge of Professor Harry W. Gardner, '94, who has handled the situation with good judgment and wisdom. No innovations or changes have been attempted on account of Professor Emerson's absence and the school has run quietly and satisfactorily.

The enrollment has continued about up to the limit that the staff and building can care for (about 270 students). It is interesting to note that the American Institute of Architects is agitating the question of fewer students in architectural schools, because at present too many are turned out to fill the vacancies in the profession. "Fewer and better students" is the plea of the profession.

To this we may answer that Technology has been caring for this matter by

- (1) the stiffening of entrance requirements;
- (2) the increase in tuition;
- (3) lengthening the architectural course from four to five years;
- (4) weeding out the poor students throughout the four years.

The number of outside prizes won by students during the last year is less than usual. The Boston Society of Architects prize was won by Frederic A. Pawley, '30, and an alumnus, Carney Goldberg, '28, was the winner of this year's Rotch prize (a European traveling scholarship).

Professor Emerson has now returned and is actively at work in the Department. Professor Carlu is on a three

months' leave of absence and his place is to be taken by Professor Camelot of Paris. Professor Camelot comes highly recommended. He has been logist Prix de Rome and it is possible that this temporary change in Design heads may be of real value to the Department.

Respectfully submitted,

A. FARWELL BEMIS, '93

THOMAS C. DESMOND, '09

A. LAWRENCE LOWELL

HARRY J. CARLSON, '92, *Chairman.*

Hygiene and the Infirmary

IT IS interesting to note the increased use of this Department by the students, the Faculty, and the employees of the Institute. In 1928, approximately 19,000 patients were treated; in 1929, 24,000; in 1930, 28,118. This is partly due to the increase in numbers of students in the dormitories, but perhaps as much to the increased familiarity of all with the work of this Department. We cannot expect that this proportional increase will continue.

The annual examination of over 3,000 students is now taking place. Eight physicians are working at these physical examinations and entering those of underweight into a special nutrition class. This class had 33 members this last year and gained, on the average, almost six pounds per man.

Twenty-two men have received special investigations in regard to nose and throat. A number of students are suffering from troubles of heart, blood pressure, albumen, and colds, and here 181 men have had group lectures on their own particular trouble. These talks have been supplemented by personal conferences and examinations.

The Infirmary proper has been very busy at times during the year and particularly so during the heavy grippe period, when 26 beds were filled, using the emergency ward and the solarium, as well as all the main hospital rooms.

The Infirmary needs an additional room for the nurses' lockers, dressing, and toilet purposes; the space intended for this purpose has been taken by the Department of Biology.

A study has been made of conditions at the boat-house, and it will result in a more careful heart and kidney examination of intending rowers, as well as a check on all men before and after their daily exercise.

In general, the work of the Department of Hygiene and the Infirmary is carried on most effectively under the able guidance of Dr. George W. Morse.

Respectfully submitted,

WILLIAM R. KALES, '92

WILLIAM S. FORBES, '93

HARRY J. CARLSON, '92, *Chairman.*

THE INSTITUTE GAZETTE

Annual Alumni Dinner

“**K**EN thou ought of the Annual Dinner?” Like the maiden who was thrice demure as a cover for her eagerness, many shy alumni have gingerly broached this question, and now it can be answered.

The Annual Dinner of the Alumni Association is scheduled for the evening of Saturday, February 6, at 6:15. It is to be held as it was last year in the main ballroom of the Hotel Statler, Boston.

Preceding the dinner there will be a reception affording alumni and their guests an opportunity to meet the officials of the Institute. The reception and dinner is opened to women guests and wives as it was last year. The Committee on Assemblies, in fact, urges alumni and alumnae to come accompanied. There is to be a dance immediately following the dinner.

Among the items on the program will be an exhibition of interest to friends and alumni of the Institute, a speech by President Compton on the “Institute’s Educational Policy,” and another by Dr. Allan Winter Rowe, ’01, on “Undergraduate Activities and Student Life.”

Descriptive material as well as ticket applications will be sent shortly to all alumni within reach of Boston. Formal dress will be in order.

155th Alumni Council Meeting

TWO votes of major importance were taken at the Alumni Council meeting in Walker Memorial on November 30. The first of these was to accept the report of the Reorganization Committee which has been actively at work for a period of more than two years. The second was to instruct the Nominating Committee to submit this spring to the Alumni Electorate only three names to fill the three vacancies on the Institute’s Corporation.

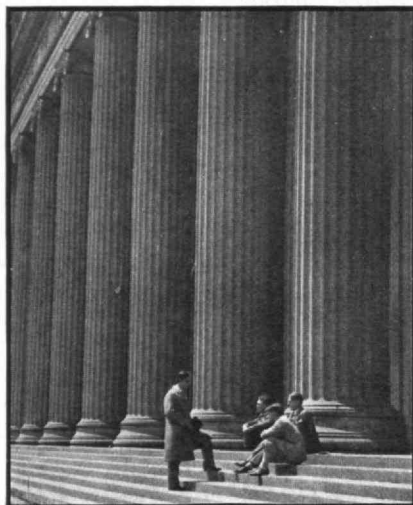
The report of the Reorganization Committee, after reviewing in great detail the results of the questionnaire sent to all former students of the Institute last summer, presented the following conclusions and recommendations:

“After due consideration of the results of these questionnaires, the earlier comments of individual alumni and alumni groups on the several committee reports which have been offered in the past few years, and with a careful analysis of the several factors which operated to bring this Committee into being and define

the scope and character of its work, your Committee feels that certain conclusions are warranted.

“First, the earlier complaint of a disenfranchisement of the alumni group as a whole would seem to be an individual reaction rather than a true expression of opinion of the group of former students. In a matter touching their interests so nearly and offering them every opportunity to take over the full conduct of the affairs of the Alumni Association, but 8% of the total number and but 40% of the equivalent group usually replying on the annual ballot for officers of the Association and for Term Members of the Corporation have had the interest to put themselves on record. Those replying constitute but a small numerical fraction of the group who pay dues to the Alumni Association. *The question of a general nation-wide dissatisfaction would seem to be answered in terms that cannot be mistaken.*

“Second, the present system of electing men for nomination as Term Members to the Corporation is unsatisfactory to alumni and Corporation alike. The substitution of a three-candidate ticket to be formulated by a nominating committee which shall derive from the alumni body as a whole would seem to be definitely a method of choice thoroughly acceptable to the small number of alumni who have placed themselves on record in this connection. Your Committee feels certain that the nomination of three rather than nine candidates is, for many reasons which need not be canvassed here as they are familiar to all, the course which is preferable. Equally, your Committee is mindful of the potential difficulties of organizing a nominating committee which shall be elected by sectional groups of the entire alumni body. The disappointing and non-representative character of the response to this questionnaire raises the grave question as to how far a nominating committee deriving from general suffrage is to be regarded as more representative than is the present nominating committee which derives in part, at least, from directly elected representatives of every class in the Institute and in smaller part by the directly appointed representatives of the several local clubs. As, however, the present method of composing the nominating committee has been a principal basis for the hostile criticism offered to the existing system, it seems wise to your Committee to make an effort to embody the general idea of a national nominating committee to carry out the important function of providing Term Members for the Corporation. To avoid any final commitment until the plan has had adequate trial, your Committee con-



siders the formulation of a tentative plan which can be put into force for a limited stated term of years which can then be evaluated on the basis of actual performance for final confirmation or discontinuance.

"Third, inasmuch as the appointment of an Alumni Director is disapproved by the Corporation and is a question upon which the alumni body would seem to be nearly equally divided but with a slight dominance of approval of the present system, your Committee feels that the appointment of an Alumni Director may suitably be dropped from further consideration and the present method of operation confirmed.

"Fourth, the policy of conduct of The Technology Review would seem to be the one question upon which an overwhelming majority of the alumni are in hearty accord. That this should be so is not surprising in view of the outstanding record made by this journal during its more recent years of operation.

"Fifth, your Committee considers the plan whereby the alumni body be constituted of (a) full members, to be designated as 'Members,' who are either graduates of M. I. T. or such non-graduates as shall be elected to membership as at present, and (b) associate members who shall be those students such as those of the earlier Army and Navy schools or similar groups who shall be elected to such a degree of affiliation under conditions which shall be established and incorporated in the working instrument of the Association.

"Sixth, inasmuch as the continuance or disbandment of the Technology Clubs Associated is a matter of primary concern only to the local club in its association with other local clubs, your Committee feels that this is a matter which can be properly and appropriately settled only by the action of the body in question itself. It would call attention to the fact, however, that the discontinuance of The Technology Clubs Associated will increase very materially the difficulties of operation of the composition of a nominating committee through the suffrage either of the entire group of former students or of the Alumni Association."

SUMMARY

"Your Committee recommends:

1. That that portion of the Constitution dealing with the election of candidates for nomination as Term Members of the Corporation to that body be suspended for a limited term of years, the exact number to be decided on subsequently, and
2. That a plan be devised which will permit of the election of candidates for Term Membership by a nominating committee which itself shall be elected on a geographical or similar basis by the Alumni Association operating as a whole or in sectional groups.
3. Further, that this nominating committee shall conduct its work largely or entirely by correspondence and in camera and that it shall have final power to present the names of three candidates and three only to the Corporation for the action of that body.
4. That the Association continue to function with an Alumni Secretary who shall attend to routine matters and correspondence as at present, and
5. That consideration shall be given to an expansion of the program now in force whereby a variety of speak-

ers shall be sent to local clubs to present to the members of the latter matters pertaining to the Institute of interest to them.

6. That the Alumni Association consist of two grades; namely, 'Members' who shall be either graduates, who attain this status automatically on graduation, or former students who shall be elected under substantially the conditions which obtain at present, and 'Associate Members' who shall be elected from the group of former students at the earlier Army and Navy schools or similar groups which at some future time may come into being.

"Your Committee presents this material for your discussion, consideration, and action. In order to facilitate the latter it recommends, finally:

7. That a Committee with power be appointed by the President to realize such portions of this report as require changes or suspensions in the existing constitution and by-laws of the Alumni Association and to formulate plans embodying such other recommendations as do not affect immediately and directly these working instruments."

In accepting this report the Council at the same time voted that the President be empowered to appoint a committee to put the report's recommendations into effect. This the President did and included on this Constitutional Committee Allan W. Rowe, '01, Harold B. Richmond, '14, Donald G. Robbins, '07, Francis J. Chesterman, '05, Francis E. Stern, '16, and Samuel C. Prescott, '94, as chairman.

Despite the weighty consideration that it necessarily gave to this report, the Council meeting had its lighter moments. Charles W. Aiken, '91, recently returned from Australia, was required to pinch hit as a salad orator and he dwelt at length on a marvelous insect (or maybe it is a worm) that is found in the southern hemisphere (of Aiken's brain). This animal lives in a cellophane cell that is suspended from the branches of trees and is equipped with electric headlights. Hanging from it are fish lines on which are placed at intervals attractive drops of nectar to serve as bait for the insect's prey. Mr. Aiken also told of the eating customs which had come to his notice and described a very ingenious knife which could be used either as a split knife for eating whole peas or as a whole knife for eating split peas. A safety combination spoon was another interesting tool which he found. This had a filtering arrangement enabling it to distinguish between various kinds of soup.

The Secretary reported that Robert C. Ashworth, Jr., '25, had been elected the new representative of the Fall River Club and that D. L. Rhind, Assistant Bursar of the Institute, had been made a regular guest.

After Mr. Ashworth's presentation at the Council, Samuel C. Prescott, '94, presented resolutions on the death of Dr. Stratton, and C. Frank Allen, '72, on the death of Howard A. Carson, '69.

Institute's Property on Boylston Street

ROGERS Building on Boylston Street, the center of the old Institute in Boston, is now the headquarters of the Department of Architecture, while the

Walker Building on the western side of Rogers is now being used by Boston University although it is still owned by the Institute.

The land on which both of these buildings stand was granted to the Institute by the Commonwealth of Massachusetts in 1861. The grant specified certain restrictions. Everett Morss, '85, Treasurer of the Institute, has had the legal firm of Rackemann, Sawyer and Brewster prepare a report on the acts and resolves of the general court relating to the M. I. T. and on the title and restrictions of the Boylston Street Property. Below are presented excerpts from the latter report:

"The Commonwealth of Massachusetts, by chapter 183 of the Acts of 1861, granted to the Institute the westerly two-thirds of the square in Boston bounded by Berkeley, Boylston, Clarendon, and Newbury Streets, subject to the restrictions that not more than one-third of the land should be built upon and that the land should never be sold but should be kept as an open space or used by the Institute for its educational purposes. The easterly one-third of the square was at the same time granted to the Boston Society of Natural History.

"The rights of the Commonwealth to enforce these restrictions were released by chapter 438 of the Acts of 1903, but the release was subject to the rights of other

persons, and subject to new restrictions that buildings should be set back certain distances and that the land should never be used for a stable or for mechanical or manufacturing purposes.

"These restrictions have been passed on by the Supreme Judicial Court three times.

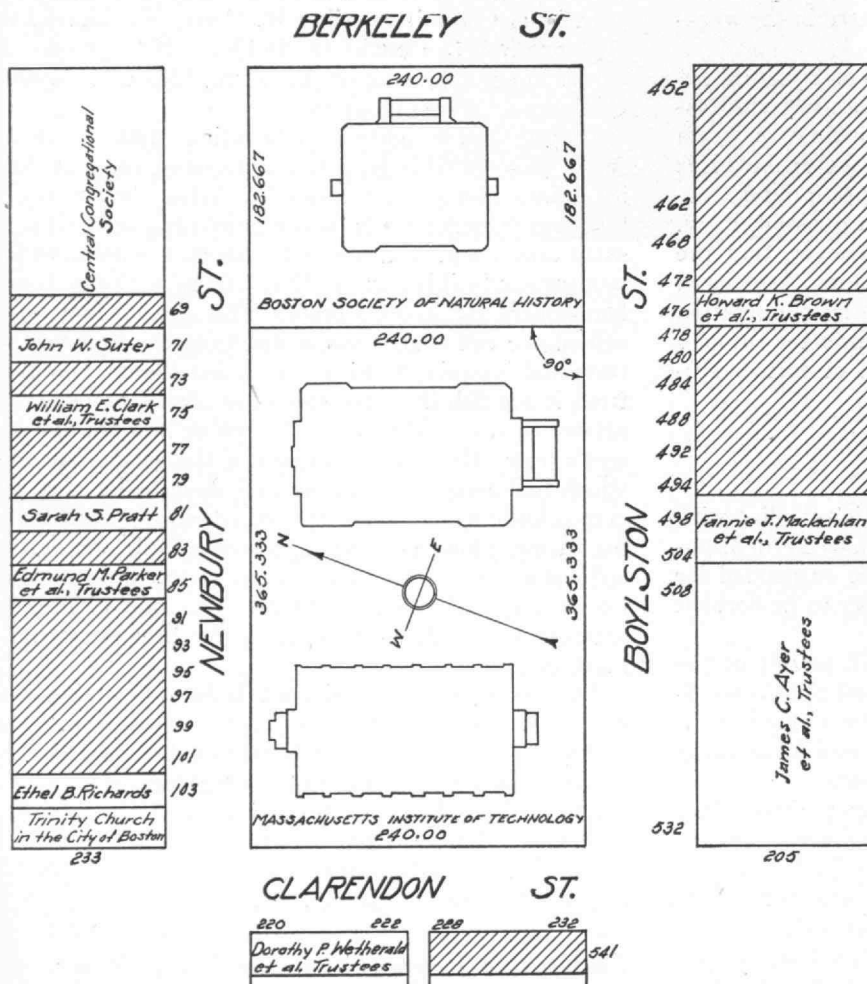
"In the first case, *Wilson v. Massachusetts Institute of Technology*, 188 Mass. 565, decided in 1905, the court held that the Act of 1861 operated to create in the owners of abutting land equitable rights to enforce the restrictions imposed by the Act, which rights were not affected by the Act of 1903, and granted an injunction against the erection of buildings covering more than one-third of the land.

"In the second case, *Boston Society of Natural History v. Massachusetts Institute of Technology*, decided without opinion on January 1, 1906, the Court held that the Act of 1861 created no restrictions in favor of the Natural History Society.

"In the third case, *Massachusetts Institute of Technology v. Boston Society of Natural History*, 218 Mass. 189, decided in 1914, the Court held that the restriction against the sale or transfer of the property had been abrogated to the extent that the bare legal title could be sold or transferred, but only subject to the restrictions, imposed by the original Act, that the

land must be kept open as an open space or used for the educational purposes of the Institute; that there was no restriction on the Institute's right to change the locations of its buildings, provided the other restrictions were not violated; that if the circumstances of the neighborhood were to so change that the restrictions ought not to be specifically enforced, they would, nevertheless, still remain in existence as a subject of pecuniary compensation, and that the only properties entitled to enforce the restrictions imposed by the original Act, so far as they remained in force, were the lots abutting on Boylston, Clarendon, and Newbury Streets and facing the square, that is, only the lots on the south side of Boylston Street and the north side of Newbury Street, between Berkeley and Clarendon Streets, and the lots on the west side of Clarendon Street between Boylston and Newbury Streets.

"The case last mentioned was based on petitions to the Land Court brought by the Institute for registration of its title and for a determination of the validity, nature, and extent of the restrictions, and decrees were finally entered in the Land Court in accordance with the rules laid down in this case. Title was registered subject also to the provisions of certain instruments signed by the Institute in (*Concluded on page 190*)



The Boylston Street (Boston) property of the Institute and its environs. The cross-hatched lots on the plan have released the Institute from the restrictions described in the adjacent report. The remaining lots had not released as of August 31, 1931



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LUXURY AFLOAT

(Concluded from page 165)

and Marine Engineers. Since passenger traffic is so seasonal, as Mr. Peterson pointed out, there "are very few trips a year when the 900- and 1,000-footers will approach capacity in passenger-carrying performances, and during the remainder of the year these vessels will not carry any more passengers than, say, the 600- or 700-footers. . . ."

Mr. Peterson's estimates as to the expected annual return on the capital invested are illuminating. A 500-foot liner, operated at about 17 knots sea speed, might reasonably be expected to yield about $5\frac{1}{2}\%$; a 600-footer at $18\frac{1}{4}$ knots, 7%; a 700-footer at nearly 20 knots, slightly better than 3%; an 800-footer at $21\frac{1}{4}$ knots, slightly better than 1%. His reckonings showed that 900- and 1,000-footers, even if operated at under 24 knots, would show losses in the neighborhood of $3\frac{1}{2}\%$ and $8\frac{1}{2}\%$, respectively.

From what has been set forth above, it must not be construed that world shipbuilding is booming. On the contrary, while Lloyd's reported that for fiscal 1931 (as of June 30) tonnage added during the year was about 97% of fiscal 1930, the tonnage of plans passed for new vessels during 1930-31 totaled but 27% of that approved during 1929-30. The gross tonnage of all vessels afloat on June 30, 1931, was about 70 millions, an increase of 21 millions over the corresponding figure for 1914. Of the 70 millions, $10\frac{1}{2}$ millions were laid up, or double the amount laid up on June 30, 1930. In addition to the $10\frac{1}{2}$ millions laid up, almost a million tons were broken up for scrap during the year.

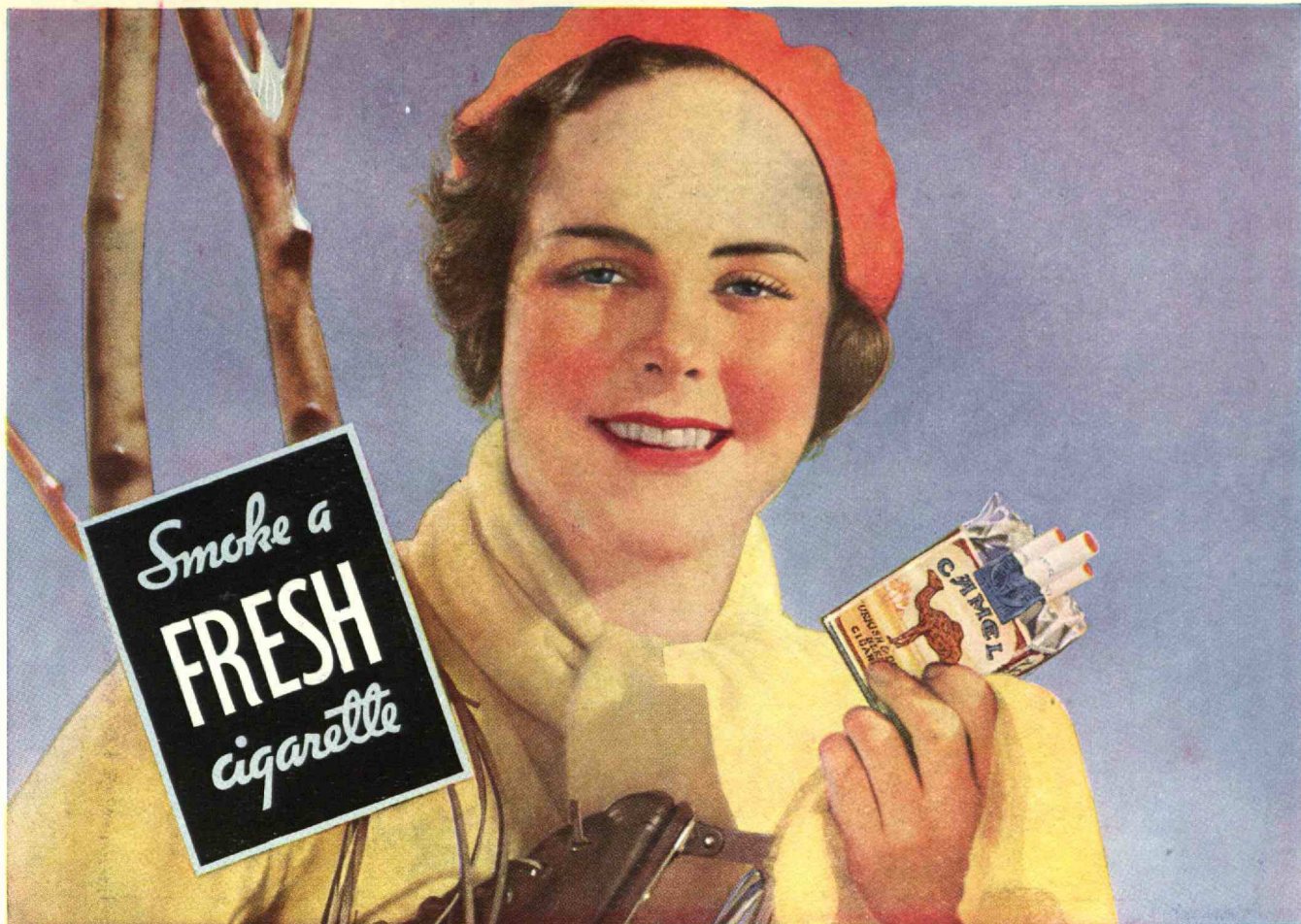
Two striking factors are to be noted in considering the 557 vessels of 1,758,610 tons added during 1930-31:

(1) Of 797,771 tons, 128 were tankers for carrying oil in bulk. These bring world tanker tonnage to over $8\frac{1}{2}$ millions compared with five in 1922 and less than $1\frac{1}{2}$ in 1914.

(2) Of the new tonnage, 223 vessels, comprising 69%, were fitted with internal combustion engines. This made a total world inventory of 4,080 motor ships compared with 1,620 in 1922 and 297 in 1914. Motorship tonnage now totals nearly $9\frac{1}{2}$ millions compared with $1\frac{1}{2}$ in 1922, and less than a quarter million in 1914. Of the 223 new motor ships, five use the diesel-electric drive, the largest being the *Permian* of 8,955 tons.

The post-War trend in types of engines and fuel for all world tonnage, including vessels of 100 tons and upwards, is shown below:

Types of Engines	1922	1931
Steam reciprocating.....	84.3%	73.1%
Steam turbines.....	13.2%	13.2%
Motors.....	2.5%	13.7%
	100.0%	100.0%
Fuel		
Coal.....	73.9%	57.2%
Oil.....	26.1%	42.8%
	100.0%	100.0%



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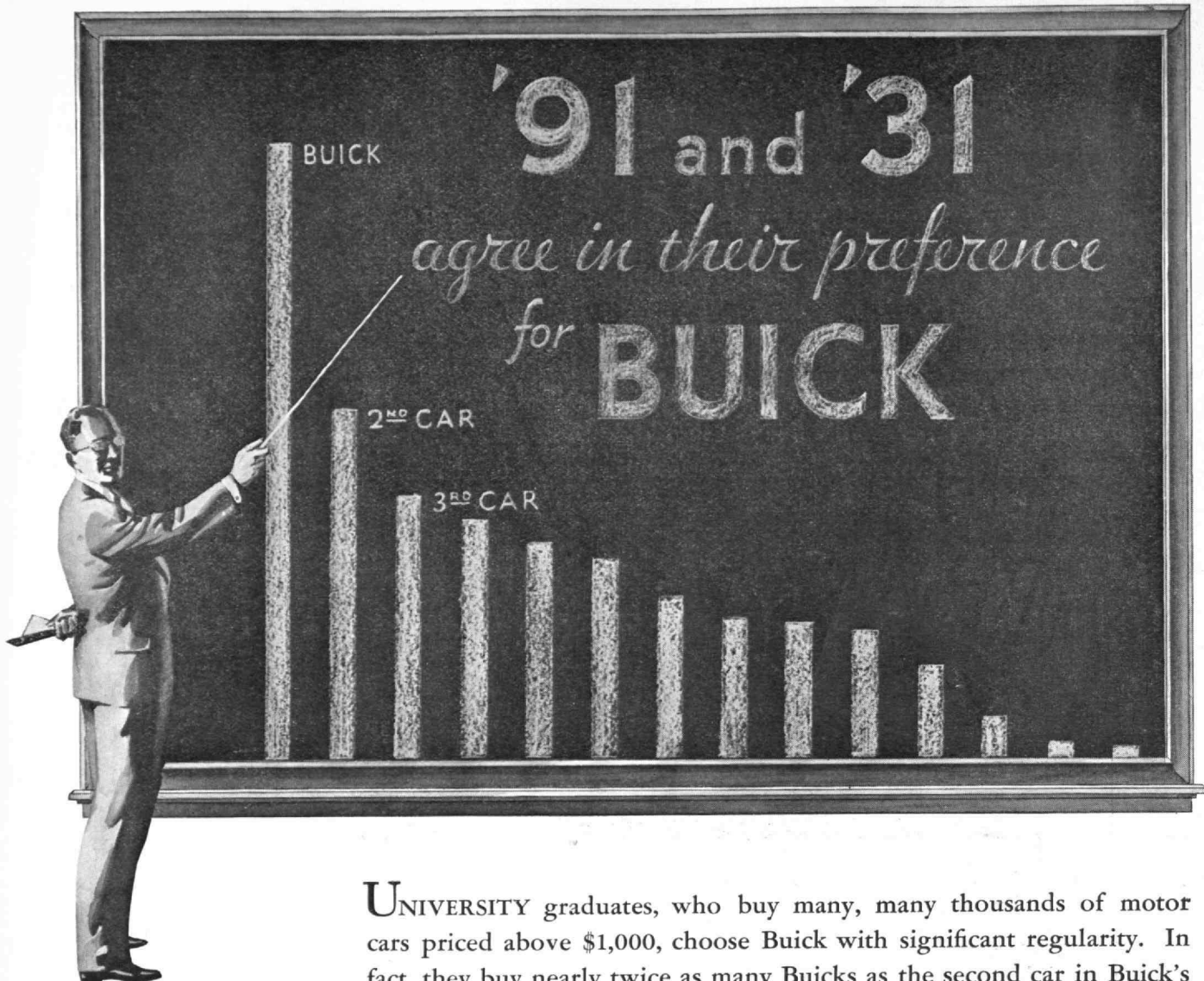
See radio page of local newspaper for time

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WHEN BETTER AUTOMOBILES ARE BUILT, BUICK WILL BUILD THEM . . . PRODUCT OF GENERAL MOTORS

THE OUTSTANDING BUICK OF ALL TIME

THE FUTURE OF ENGINEERING

(Concluded from page 164)

and no one, least of all the engineer himself, knows what surprises he may have in store."

Back of the statement is the idea, based on experience, that applied science is now the most potent factor in shaping our civilization. On it depend our means of communication, exchange of ideas and of goods, our modern houses and physical environment, our sanitation and agencies for public health, our modern methods of production. A single scientific discovery or invention, like the printing press, the electric generator, the radio tube, the automobile, may largely transform our methods of living.

But consider for a moment the significance of such developments. While these factors add to our comfort, interest, and enjoyment of life, their chief importance lies in the fact that they create opportunities for better living. Let me illustrate what I mean.

DOES this technological age bring greater human happiness than, for example, the Periclean Age of the ancient Greeks? Now, man's enjoyment of Periclean Greece would depend on his political status, on whether he was a member of the small, aristocratic class that had leisure and freedom for thought, based upon the productive power of thousands of human slaves, or whether he was one of those slaves. But in this day and generation, machinery is the slave of all men, and to an unprecedented extent all men may have opportunities for education, recreation, and the nobler things of life, because machinery is doing most of the drudgery for them. If men had to supply the energy that America uses from water power, coal, and gasoline, we should need the exhausting labor of five thousand million slaves! Such is the debt of modern man to technology. *Applied science is not an end in itself, but it is the most powerful means ever discovered for supplying the opportunity to secure the finest things of life.*

But there is one other implication in Professor Shotwell's statement. If "the pathway to the future is in the hands of the engineer," then he has a very grave responsibility! It is not enough that he should supply technical service or produce new implements for man's needs or desires; he must take a leading part in seeing to it that the new world which he is creating is a good sort of a place in which to live. He must realize the social responsibilities of his profession. Whether he is a practicing engineer, a research worker, a teacher, an architect, or a business man, his position of leadership in the economic life of the country carries with it the responsibility to take a leading part in meeting its social problems. Questions of conditions of labor, responsibility for workmen's employment, pension, suitable wage, and so on; questions of use of public funds (which exist largely because of the engineer); questions of public support of education and of research (since funds and time for them exist largely because of the engineer); questions of international policy (since he is largely responsible for international contact and communication) — all these questions must be advantageously handled, else the power of the engineer will have rendered an ill service to mankind.



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INDUSTRIAL DISEQUILIBRIUM

(Continued from page 170)

Workers become specialized to certain tasks, men and women take root in certain regions, money is invested in relatively permanent forms — these and other factors tend to reduce the mobility of labor and capital. It may take a long time to decrease the productive capacity of industries that are highly conservative and inflexible. Agriculture is one of them.

During the War the scarcity of basic commodities and the consequent high prices called forth an unprecedented output from the agricultural industry, especially in North and South America. When the War ended the industry failed to adapt itself to the new conditions. The markets for wheat, sugar, coffee, textile materials, and other staples became congested. Prices fell and this affected the ability of farmers everywhere to buy manufactured goods. So the effects of agricultural depression were communicated beyond the localities where the staple industries were situated to the chief manufacturing nations of the world. This is only one example of the manner in which one branch of production may get out of line with others because of a lack of ready response to market tendencies.

Some keen students of business insist that competition itself is a source of disturbance. They assert that producers, straining for larger profits, embark upon programs of expansion in the hope of realizing the economies of mass output, and upset the balance of demand and supply by overestimating the proportion of the total demand which their competitors will allow them to secure. This is another instance of imperfect market foresight and is undoubtedly an important cause of maladjustment. But perhaps even more unsettling are the attempts to avoid the results of cut-throat competition by some method of price control that leaves production unchecked. This kind of device is generally worse than useless, for, by holding out the hope of higher prices or deferring the arrival of a fall in price, it tends to stimulate output and aggravate the distress. When the price control collapses the situation is much worse than it otherwise would have been. The experiment of Great Britain with rubber, of Brazil with coffee, and similar schemes of other countries nearer home have demonstrated the harmfulness of this type of interference with the free play of economic forces.

As soon as the system of prices loses its elasticity, derangements are almost certain to occur. As was indicated above, price movements have an important part to play in the maintenance of industrial equilibrium. By sinking below a profitable level, they warn us that it is time to curtail production; by rising above that point, they signal the desirability of expansion. If not permitted to move, they fail in the proper performance of these functions. Professor Arthur B. Adams points out that "large business enterprises, particularly in the fields of mining, manufacturing, and trade, through monopolies, cartels, and trade associations have been able in great measure to hold the prices of their products at stable points in the face of an increasing output. The farmers, on the other hand, partly because of the lack of joint ability to control out- (Concluded on page 188)

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INDUSTRIAL DISEQUILIBRIUM

(Concluded from page 186)

put and the marketing of their products, have little power to hold up the prices of their products. Producers' control of the prices of one class of products and the lack of control by the producers of another class of products have thrown the price system out of adjustment and have caused an unbalanced development of industry."

Much of the economic legislation generated by the intense nationalistic feeling which developed during and after the War has been of a restrictive nature tending to throw the international industrial machine out of gear. Take sugar, for example. Japan, Italy, and other countries, formerly importers of this article, contrived, through import restrictions, to become much more nearly self-sufficing than they had previously been, with the result that there was a congestion of supplies in the open market. It is essential to the stability of world economy that each nation should adopt considerate policies in their commercial intercourse with others, especially if this intercourse is of long standing. After business has become adjusted to established tariffs and other political restrictions, changes in this legal framework may throw into disorder the whole complex system of international trade relations.

Perhaps enough has been written to indicate the type of disturbance that is constantly threatening to interrupt the orderly progress of business. The severity of the present depressed condition of industry is due to the simultaneous operation of these and other less important causes of derangement. To persons of a radical turn of mind, they may suggest the necessity for revolutionary changes of a socialistic nature, such as the abolition of competition and the substitution of social control after the manner of the U. S. S. R. But in the minds of the more conservative, an understanding of the underlying tendencies to maladjustment is more likely to evoke some practical ideas for the strengthening of our economic system against the recurrence of another period of stagnation.

THE HUMAN POWER PLANT

(Concluded from page 162)

but it is not the last word in this type of apparatus by any means. Certainly much more sensitive instruments, with wider frequency response, are needed for research into detail. Much is yet to be learned of the underlying causes of the phenomenon which is studied broadly in electrocardiography and the like. Instruments which will produce accurate records of the potential differences appearing in single cells, in nerve fibers and so on, may well lead to much of interest and value, and the work is proceeding intensely in many research laboratories of medicine, biology, and physiology. The physicist and the electrical engineer can cooperate best in this research by the supplying of tools and the analysis of the strictly physical aspects of the extremely complex phenomena involved.



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INSTITUTE GAZETTE

(Concluded from page 182)

connection with a Hyatt light and an area in the sidewalk, and a steam pipe to other property of the Institute.

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Through this Division the Institute's Laboratories and the services of its Staff are made available for problems not adequately provided for in the usual equipment of consulting engineers and industrial research laboratories.

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In the interest of Employers and of Alumni the Division maintains a List of Graduates with records of their experience and special qualifications for technical positions.

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Division of Industrial Coöperation and Research
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M. I. T. NEWS BULLETIN

PREPARED BY JOHN J. ROWLANDS, DIRECTOR, INSTITUTE NEWS SERVICE

New Weather Studies

DAILY weather observations from the ground level to a height of more than three miles above Boston are being made by meteorologists of the Institute in an airplane equipped to record temperature, barometric pressure, and relative humidity.

To carry out this work Technology purchased in November a Cessna cabin monoplane, powered with a 120 horse power Warner engine. The daily flights of this plane are part of a research program designed to gain new knowledge to aid in weather forecasting by measuring the variation of temperature and moisture at various altitudes in different air currents.

Professor C. G. A. Rossby, who is in charge of the Institute's Division of Meteorology, hopes that these studies will develop improved methods of procedure in recording certain weather data. The investigation also provides for comprehensive studies of cloud formations and their connection with the vertical structure of the atmosphere. For this purpose specially designed photographic equipment will be installed in the plane.

The device used for registering temperature, barometric pressure, and relative humidity is called a meteorograph. The readings are automatically and continuously recorded throughout the flight on a thin sheet of smoked aluminum foil on a revolving drum. The research plane has places for three passengers in addition to the pilot, and will be fitted with various scientific instruments for special weather studies.

This program is under the immediate direction of Dr. K. O. Lange, who for several years has been engaged in similar activities for the *Rhön-Rossitten Gesellschaft* at Darmstadt, Germany, and also on the Wasserkuppe, the birthplace of the motorless airplane. During this time Dr. Lange took an active part in the development of the scientific basis for soaring and gliding flight. Daniel C. Sayre, '23, Assistant Professor of Aeronautical Engineering, is the research pilot of Technology's flying laboratory.

The daily weather flights are made in the morning from the East Boston Airport.

Changing Scenes

PLANS to make the Charles River Basin one of the most beautiful river parkways in the world were described by E. H. Rogers of the Boston Park Department, Metropolitan District Commission, at a recent dinner meeting of the Technology Student Branch of the American Society of Civil Engineers.

Mr. Rogers discussed plans for a great fill now being made on the Boston side of the Charles which calls for an extension of 115 feet from the present shore line and will necessitate a million and one-half cubic yards of filling. Two breaks will be made in this embankment, one for a boat haven protected by two breakwaters, to be constructed at the east end of the basin near the site of the Union Boat House. A second break will make possible a lagoon fronted by one breakwater, which will be joined to the shore by bridges.

Complaints that the walls along the river fail to absorb the sidewash and so tend to make the water rough led to the elimination of walls in the new fill. Instead, its sides will slope gradually into the river. A park with by-paths, but without a roadway, will be made on the reclaimed land.

Mr. Rogers also commented on the new underpass now nearing completion at the juncture of Memorial Drive and Massachusetts Avenue, a project expected to do much toward facilitating traffic on these two important arteries.

The Charles River Basin when completed will be comparable to the famous river parkway of Hamburg, Germany, after which it is being patterned, because of the great similarity of the two in area and division.

Unemployment Relief

THE students of the Institute, acting through the Executive Committee of the Institute Committee, undergraduate governing body of Technology, made a contribution of \$500 for Cambridge unemployment relief on November 25. This donation was made following a meeting of student delegates from the various educational institutions in Cambridge with the Executive Committee of the Cambridge Unemployment Relief Committee, of which Mr. Edwin H. Hall is chairman. The contribution from the students of the Institute comes from funds which have been set aside for undergraduate activities, and thus represents donations from every student at Technology.

Donald B. Gilman '32, of Quincy, President of the Senior Class and of the Institute Committee, and Carroll L. Wilson '32, of Rochester, N. Y., Treasurer of the Institute Committee, presented the donation to the Cambridge Unemployment Relief Committee on behalf of the undergraduates of Technology.

Faculty Club Dinner

THE annual fall dinner meeting of the Faculty Club for members, their wives, and friends was held at Walker Memorial on the evening of November

18, with Mr. Walter Humphreys, '97, Secretary of the Corporation, as chief speaker. "The Traditions and History of the Institute" was the subject of his address.

Other speakers of the evening included Professor James F. Norris, who told of a walking trip made through Europe last summer, and Professor Frederick K. Morris, who described the Carlsbad Caverns in Bohemia. President and Mrs. Karl T. Compton and Professor Dean Peabody, Jr., '10, President of the Faculty Club, and Mrs. Peabody were guests of honor at the dinner.

Commencing his address with the founding of the Institute by William Barton Rogers, Mr. Humphreys sketched the high lights of Institute history through the administrations of John D. Runkle, Francis A. Walker, James M. Crafts, Henry S. Pritchett, Arthur A. Noyes, '86, and Richard C. Maclaurin.

Lantern-slide pictures of former Institute presidents, and of buildings, students, and laboratories of their time, added much to the interest of Mr. Humphreys' story. Also included in his outline was an interesting account of the origin and significance of Technology traditions.

The Tech Cabin

PRESIDENT and Mrs. Compton, several members of the Institute Faculty, and officials of the Technology Christian Association spent the week-end of November 14 at the Tech Cabin at Lake Massapoag.

Among those who visited the cabin were Mr. and Mrs. Horace S. Ford; Professor and Mrs. William P. Ryan, '18; Professor and Mrs. Leicester F. Hamilton, '14; Mr. Wallace M. Ross, Secretary of the Technology Christian Association, and Mrs. Ross; Mr. Pennell N. Aborn, Employment Secretary, and Mrs. Aborn; Mr. Frank L. Locke, '86, Personnel Director, and Mrs. Locke; and Mr. Percy R. Ziegler, '00, President of the Advisory Board of the T. C. A.

The Tech Cabin has become increasingly popular with Institute groups and has been occupied practically every week-end since the opening of school.

On Earthquakes

PROFESSOR Kioji Suyehiro, Director of the Earthquake Research Institute of the Tokyo Imperial University, delivered a series of lectures on earthquake investigations at the Institute last month.

The first of these lectures, "Earthquake Research," was delivered on November 30, and on December 1 Professor Suyehiro spoke on engineering seismometry, a

subject of great interest to engineers because of the need for new knowledge of the effects of earthquakes on engineering and building structures. "Vibrations of Buildings Caused by Earthquakes" was the subject of the third lecture, which was given on December 2.

Professor Suyehiro is one of the leading investigators in earthquake research and has written numerous papers on various aspects of the subject.

National Research Council Meeting

TECHNOLOGY was well represented at the fourth annual meeting and conference of the National Research Council's Committee on Electrical Insulation held at Harvard University on November 13 and 14.

Dr. Compton addressed the conference dinner meeting at the Faculty Club on "The Distribution of Electricity in Molecules." Professor F. G. Keyes, Head of the Department of Chemistry, spoke on "Dielectric Constant and Molecular Interaction," and Professor John C. Slater, Head of the Department of Physics, discussed "Molecular Structure and Valence." Professors J. C. Balsbaugh, '24, and P. H. Moon, '27, of the Department of Electrical Engineering presented two papers, one on "A Precision Bridge for the Measurement of the Power Factor of Small Oil Samples," and another on "The Power Factor of Air Condensers." "The Dielectric Analogies of Ferromagnetism" was the subject of a discussion by Professor Hans Müller of the Department of Physics.

President Compton in the course of his address discussed the electrical effect of placing any insulating material, solid, liquid, or gaseous, between charged metal electrodes, and the information thereby gained concerning the electrical constitution of the individual molecules of the insulator.

"This introduction of an insulator causes a reduction in the voltage difference between the electrodes," Dr. Compton stated. "By observing the amount of this voltage reduction at two different temperatures, it is possible to calculate with what average degree of firmness the electrons in these molecules are held to their normal positions, and also to calculate how far the 'center of gravity' of the electrons in the molecule is from the 'center of gravity' of the positively charged nuclei."

"It is thus found, for example, that molecules of ammonia, water, and hydrochloric acid are electric doublets; that is, are the electrical analogue of magnets, having positive and negative poles, whereas oxygen, ordinary insulating oils and benzene are non-polar, that is, electrically symmetrical. Many important electrical properties of insulating materials are due to these polar or non-polar characteristics of the molecules. The information given by these studies is also valuable in testing theories of molecular structure and especially in determining the choice between rival theories."

Professor P. Debye of Leipzig, Germany, formerly a visiting lecturer in physics at Technology, was credited by Dr. Compton with the first interpretation of these electrical phenomena.

According to Dr. Compton, Debye showed that two things happen when the insulator is placed in an electric field: that the electricity shifts its position in the molecules, and that the molecules themselves tend to turn around if they are electric doublets. Since Debye first promulgated his theory, the study of molecular structure by such methods has been actively carried on all over the world.

Professor Debye will return to the Institute next spring to take part in scientific conferences in connection with the opening of the new research laboratories of chemistry and physics.

A Tribute to Professor Sedgwick

DR. SAMUEL C. PRESCOTT, '94, Head of the Department of Biology and Public Health at the Institute, delivered the principal address at the dedication exercises of the William Thompson Sedgwick Junior High School at West Hartford, Conn., on the evening of November 13. As an intimate friend and close associate of Professor Sedgwick during his years at Technology, Dr. Prescott paid high tribute to the character and accomplishments of the founder of the Institute's Department of Biology, to whom the new building was dedicated.

"I feel sure," said Dr. Prescott, "that no monument which could have been erected would so adequately represent Professor Sedgwick's many-sided activities as teacher, patriotic public servant, and worker for the great cause of human welfare. Certainly none would have been more pleasing to him. On the other hand, I am equally sure that this community and this state could not have selected a native son who is more worthy of such eminence, or who has more nobly won enduring regard, admiration, and honor."

William Thompson Sedgwick's boyhood was spent in West Hartford and Farmington. He attended the Hartford High School, and after graduation entered the Sheffield Scientific School at Yale University, where he prepared for the study of medicine. He was graduated in the class of 1877, and spent the following two years in medical study. He later accepted a fellowship at the then new Johns Hopkins University at Baltimore and received the degree of Doctor of Philosophy in 1881. After two years on the teaching staff of Johns Hopkins, Dr. Sedgwick came to the Institute for the purpose of creating a department of biology. He soon found that the field for his special gifts lay in the promotion of research and instruction in public health.

"It is due largely to his painstaking and careful work," said Professor Prescott, "that the public became apprised of the dangers to health from illuminating gas, from impure water, from uncontrolled disposal of waste, from unclean and impure milk supplies and from over-

crowded and unsanitary conditions. He was one of the first scientists in America to recognize the importance of the discoveries of those minute and invisible organisms known as bacteria, and he greatly advanced the researches necessary to develop methods for their detection and control. He was, in fact, a pioneer in public health, as a trio of his devoted admirers characterized him in a book written in tribute to his great human service.

"As Biologist to the State Department of Health in the important period from 1886 to 1896, he took a large share of the labor of organizing and developing the laboratories, research staffs, and special investigations which were carried on in Massachusetts during this period, and which commanded not merely local but universal attention because of their fundamental importance and great significance to human welfare.

"Perhaps Professor Sedgwick's greatest single contribution to sanitary science came as a result of his brilliant study of great epidemics of typhoid fever which ravaged certain Massachusetts cities in 1892. The toll of life from these pestilences was appalling, yet he braved the dangers and by personal gathering of facts and then applying his keenly analytical mind to their study, he worked out the method of investigation, their cause and thus the means of their control. As a result of these investigations he has been called the Father of Epidemiology. When one bears in mind that the diseases of this type literally slew their many thousands yearly before this work, the really heroic quality of this constructive service is apparent."

Professor Prescott touched upon Professor Sedgwick's service to the City of Boston, to the Town of Brookline, Simmons College, Sharon Sanatorium, and Faulkner Hospital. He told of his contributions to the many scientific groups in which he held high place, and to the United States as a member of the Advisory Board of the Public Health Service.

"But it is William Thompson Sedgwick, the warm-hearted, great-souled man, who was always ready to give wise and kindly encouragement and advice, and to lend a helping hand, that we wish to recall tonight," said Professor Prescott. "Those traits which so endeared him to his intimates in his undergraduate days — his humor, his sympathy and understanding, and his fairness, consideration, and desire to help those less fortunate than himself — endured and expanded throughout his life. These, together with his remarkable gift of imparting knowledge and a wise, sane philosophy of the conduct of life, made him the ideal teacher, and he inspired his students with the love of learning and the desire to be useful members of society. In turn, he received from them an homage amounting almost to hero worship.

"He took great interest and believed thoroughly in the public schools, and spent hours with teachers and principals, discussing their problems and suggesting

methods for improvement. I think he was convinced that the public school was destined to be the agency through which the general level of physical welfare and thus of public health was to be raised, and also that it should tend to counteract the dangers of radicalism and false doctrine and emphasize clear thinking, patriotism, and good citizenship.

"Professor Sedgwick's influence can briefly be expressed by the statement of one of his pupils who wrote of him, 'He taught me to know good work and to despise poor work, to struggle for the truth and to demolish superficiality and cant. He gave me a point of view which has carried me through everything I have attempted to do and which I expect will carry me on to the very end.' Could any teacher ask to do more?"

"It is most fitting that in this happy way the name of William Sedgwick will stand before the youth of this community as the representative of an ideal of character and service to which they may aspire. May something of his great spirit, his faith in humanity, and his patriotic zeal pervade these walls and keep warm and vital the conception of education which was his—a fuller knowledge of the world about us, an acceptance of the opportunities for self-advancement, an appreciation of the things that add to the enrichment of life, and most of all, a help toward the evolution of sound and enduring principles of the conduct of life in all its human relations and to our community and our country."

Herbert S. Gott on World Affairs

THE work of 15 years spent in the social reconstruction of war-torn Europe was described by Herbert S. Gott '10 in an address given under the auspices of the Technology Christian Association on November 23. Mr. Gott, for 11 years National Secretary of the Young Men's Christian Association in Esthonia, spoke before students and faculty members at the Institute on the subject, "Rebuilding a Nation."

As guest of honor at a dinner given by the Advisory Board of the Technology Christian Association and attended by President Compton and other officials of the Institute, Mr. Gott described some of his personal experiences in Russia, Esthonia, and Manchuria. He also addressed a luncheon meeting of the Faculty Club.

During the World War Mr. Gott and his family were sent by the American Y. M. C. A. to Siberia for service among prisoners of war and later with the Russian Army. In 1920 he went to Esthonia to work with leaders there in developing a national Y. M. C. A. movement. He was under fire for eight days during the Russian Revolution, and finally escaped with his family from Irkutsk to Yokohama. Returning to Irkutsk, he was driven out a second time. He then went to Harbin and at the close of the war organized a Y. M. C. A. for refugees in that city.

In the early days of his work in Esthonia, Mr. Gott helped to establish 30 schools which served the children of thousands of Russian refugees. This was followed by the establishment of Y. M. C. A. centers in leading cities, smaller towns, and student communities. The appreciation of the Esthonian people for Mr. Gott's service was expressed by a celebration held in his honor on the tenth anniversary of his arrival in the country, at which time he was decorated by the Government.

Mr. Gott was born in Gloucester, Mass., and was educated at Technology. He entered social work with the Y. M. C. A. of Boston in 1913.

Undergraduate Elections

EDWARD J. COLLINS, Roxbury, was chosen President of the Class of '35 at elections held on November 10. Arthur I. Zich, Allston, was elected Vice-President; G. Peter Grant, Plandome, N. Y., Secretary; and Chester E. Bond, Everett, Treasurer. Henry F. King of Arlington and John W. Hunt of Brooklyn, Conn., were selected to represent the freshmen on the Institute Committee, while Richard L. Shaw and John E. Tyler, both of Newton, were elected to Executive Committee membership.

Collins, the new freshman President, is a graduate of the Mechanic Arts High School in Roxbury, and before coming to the Institute attended Loyola College. Vice-President Zich prepared for Technology at the Public Latin School in Allston.

Professor Horwood

MURRAY P. HORWOOD, '16, Associate Professor of the Department of Biology and Public Health at the Institute, was recently made a member of the Committee on Housing and the Community, a division of President Hoover's Conference on Home Owning and Home Building.

Dr. Calvin W. Rice Honored

THE dinner given in New York on December 3 by the American Society of Mechanical Engineers in honor of Dr. Calvin W. Rice, Secretary of the Society for the past 25 years, had particular significance to Technology. Dr. Rice, a graduate of the Institute in the Class of 1890, was made an honorary member of the Society, one of its highest honors, in recognition of his long and valuable service. The presentation was made by Dr. John R. Freeman, of Providence, a member of the Class of 1876, and President Karl T. Compton delivered the address in which tribute was paid to Dr. Rice's distinguished career in engineering.

Dr. Rice is a native of New England. He was born in Winchester, Mass., received his early education in the public schools of Boston, and then entered Technology. Following his graduation in 1890, Dr. Rice was engaged for 16 years

as an electrical engineer, hydraulic engineer, and mining engineer in various parts of the country, as an employee of the General Electric Company, the Anaconda Copper Company, the New York Edison Company, and as an independent consultant.

Dr. Rice became Secretary of the American Society of Mechanical Engineers in 1906, since which time the membership of the organization has increased from 2,500 to 20,000, with student branches and local sections throughout the country. The society holds the remarkable record of having nearly 10% of its total membership actively engaged on work under the auspices of its committees on publication, on research, on standardization and codes, on the development of the various aspects of mechanical engineering as an art, on international relationships, and on the code of ethics for the profession.

In addition to this remarkable organization, Dr. Rice is credited with a major part in inducing Andrew Carnegie to build the great engineering societies' building in New York, which serves as the coöperative headquarters of the four great engineering organizations.

Popular Science Lectures

THE annual series of Popular Science Lectures given under the auspices of the Society of Arts at Technology opened on December 13, with an address on "Light and the World of Atoms." The lecture was delivered by Dr. George R. Harrison, Professor of Physics, and was illustrated with slides, models, and experiments.

"Airships—America Steps Ahead With the Akron" will be the subject of the second lecture of the series, to be delivered by Dr. Richard H. Smith '18, Professor of Aeronautical Engineering, on January 17. Dr. John W. M. Bunker, Professor of Biochemistry and Physiology, will discuss "Light and Life" in a lecture on February 14. The concluding address of the series will be given on March 13, by Dr. Wayne B. Nottingham, Assistant Professor of Physics, on "Electrons at Work in Pure and Applied Science."

Departmental Lectures and Colloquia

MATHEMATICS

Lectures.—"History of Differential Geometry," Professor D. J. Struik, November and December weekly.

ELECTRICAL ENGINEERING

Colloquia.—"The Development in Problems of High-Speed Cable Telegraphy," Mr. G. A. Randall, Research Department, Western Union Telegraph Company, November 2 and 3.

"Problems of Street Lighting Design," Mr. C. A. B. Halvorson, Consulting Engineer, and Mr. E. M. Crawford, both of the General Electric Company, November 16 and 17.

"Engineering Cost Studies," Mr. F. M. Carhart '05, of the firm of Jackson and Moreland, November 23 and 24.

PHYSICS AND PHYSICAL CHEMISTRY

Colloquia. — "New Developments in Sonic Direction Finding," Professor G. W. Pierce; "Some Thermodynamic Speculations," Professor P. W. Bridgman; Harvard University, November 2.

"Survey of Current Problems in Geophysics," Professor L. B. Slichter; "Displacement Interferometry as a Method of Measuring Simultaneously the Refractive Index and Dispersion of a Gas," Dr. C. E. Bennett, November 5.

"The Big Electromagnet at Paris," Professor N. H. Black; "Recent Developments in the Technique of High Voltage and High Voltage X-rays," Dr. Egon Lorenz; Harvard University, November 9.

"The Use of Vacuum Tubes as Electrometers," Professor E. L. Chaffee '07; "Isotopes and Band Spectra," Dr. J. L. Dunham; Harvard University, November 16.

"Color Effects in Ceramic Glazes," Professor F. H. Norton '18; "New Researches on Hyperfine Structure," Dr. John Wulff; Technology-Harvard University, November 18.

"Recent Progress in the Study of Cosmic Rays," Dr. Ralph D. Bennett; "Rectifying Action of Cuprous Oxide

in Contact with Other Metals," Dr. J. M. Ide; Harvard University, November 30.

"Report on the Chicago Meeting of the American Physical Society," Professor W. B. Nottingham, December 3.

Lectures. — "The Theory and Practice of the Vacuum Tube Electrometer," Professor W. B. Nottingham, before the Technology Physical Society, November 3.

"An Attempt Toward a Closer Correlation of Classical and Wave Mechanics," Dr. Lloyd A. Young; Harvard University, November 10.

"Ether Drift Experiments," Professor Dayton C. Miller, of the Case School of Applied Science; Harvard University, November 19.

"The Spectrum of Nova Pictoris," Mr. H. Spencer Jones, His Majesty's Astronomer, Cape of Good Hope, Astronomical Colloquium; Harvard University, November 19.

"The Hydrogen Molecule Problem," Mr. N. Rosen '29, at Theoretical Seminar, December 2.

"The Measurement and Calculation of Heats of Absorption," Professor L. J. Gillespie, at Physical Chemistry Conference, December 3.

"The Rates of Pyrolysis of Certain Ethers of Triphenyl Carbinol," "The Cracking Temperatures of Certain Esters of Triphenylacetic Acid," Mr. A. Cress-

well, at Joint Conference of Inorganic, Organic, and Physical Chemistry, November 5.

"Conductivity of Sodium Potassium Amides in Liquid Ammonia," Dr. W. W. Hawes, at Joint Conference of Inorganic, Organic, and Physical Chemistry, November 19.

William Thompson Sedgwick Memorial Lecture

THE ninth annual William Thompson Sedgwick memorial lecture was delivered at the Institute on December 1 by Dr. Henry E. Sigerist, of the Institute for the History of Medicine, University of Leipzig, Germany. Dr. Sigerist discussed "The Philosophy of Hygiene."

The Sedgwick Memorial Lectureship was established for the purpose of commemorating the services of William Thompson Sedgwick to the cause of biology and public health. The lectures are given annually under the auspices of Technology's department of biology, which he created, and are delivered by men distinguished in some subject concerning biology and public health.

Among the members of the committee in charge of the lectureship are Dr. Samuel C. Prescott '94, Head of the Department of Biology and Public Health, and Professor Clair E. Turner '17, of the same department.

TEAM SCHEDULES

of the

M. I. T. Athletic Association for 1931-1932

VARSITY BASKETBALL

Dec. 5	Newport Naval	Home
Dec. 12	Open	
Dec. 15	Rhode Island State	Away
Dec. 19	Clark University	Home
Dec. 13	Harvard	Away
Jan. 15	Brown	Home
Feb. 13	Lowell Textile	Home
Feb. 19	Pratt Institute	Home
Feb. 20	Stevens Institute	Away
Feb. 26	New Hampshire	Home
Mar. 2	Tufts College	Away

FRESHMAN BASKETBALL

Dec. 5	Open	
Dec. 9	Open	
Dec. 12	Wentworth	Home
Dec. 15	Rhode Island	Away
Dec. 19	Harvard	Away
Jan. 9	Dean	Away
Jan. 13	Boy's Club	Home
Jan. 16	Brown	Home
Feb. 17	Andover	Away
Feb. 19	Dartmouth	Home
Feb. 20	Tabor	Away
Feb. 24	Worcester	Away
Feb. 27	Tilton	Home
Mar. 2	Tufts	Away
Mar. 5	Dummer	Away

HOCKEY

Dec. 9	Harvard	Home
Dec. 12	Princeton	Away
Dec. 18	Boston University	Home
Jan. 6	Northeastern	Home
Jan. 13	Brae Burn	Away
Jan. 16	Williams	Away
Jan. 30	New Hampshire	Away
Feb. 9	Amherst	Away
Feb. 17	Dartmouth	Away
Feb. 19	Northeastern	Home
Feb. 26	Brown	Away

WRESTLING

Dec. 18	Harvard	Home
Jan. 9	Yale	Away
Jan. 15	Tufts	Away
Feb. 6	Army	Away
Feb. 16	Brown	Away

Feb. 19	Norwich	Home
Feb. 25	Open	
Feb. 27	Brooklyn Poly	Away
Mar. 2	Boston University	Home
Mar. 5	Springfield	Home
Mar. 11-12	N. E. I. W. A.	

FRESHMAN WRESTLING

Dec. 18	Harvard	Away
Jan. 9	Yale	Away
Jan. 15	Tufts	Away
Feb. 5	Taft	Away
Feb. 16	Brown	Away
Feb. 19	Bucksport	Home
Mar. 5	Springfield	Home

SWIMMING

Jan. 9	Amherst	Home
Jan. 13	Harvard	Away
Jan. 16	Brown	Away
Feb. 12	Williams	Away
Feb. 13	R. P. I.	Away
Feb. 20	Dartmouth	Away
Feb. 22	Boston University	Away
Feb. 27	Bowdoin	Home
Mar. 5	Wesleyan	Away
Mar. 11-12	N. E. I. S. A.	

FRESHMAN SWIMMING

Jan. 13	Harvard	Away
Jan. 16	Brown	Away
Feb. 20	Dean Academy	Away
Feb. 27	Bowdoin	Home
Mar. 3	Brookline High	Away
Mar. 12	Dartmouth	Away
Mar. 19	Open	
Mar. 26	Boy's Club	

TRACK

Jan. 16	Andover (Freshmen)	Away
Jan. 23	B. C. Practice Meet	
Jan. 30	K. of C. Meet	Boston Garden
Feb. 6	Millrose Games	Away
Feb. 13	B. A. A. Games	Arena
Feb. 20	University Club Games	Garden
Feb. 20	Freshmen vs. Dartmouth	
Feb. 27	Interclass Indoor Meet	
Mar. 5	I. C. A. A. A. Meet	Away
Apr. 9	Spring Interclass Meet	
Apr. 30	Penn Relays	Away

Apr. 30	Freshmen vs. Andover	Away
May 6-7	Greater Boston Meet	Harvard
May 14	Wesleyan	Away
May 20-21	N. E. Intercollegiates	Away

BOXING

Jan. 16	Army	Away
Feb. 3	New Hampshire	Away
Feb. 15	Syracuse	Home
Feb. 20	Coast Guard	Away
Feb. 27	Harvard	Home
Mar. 5	Dartmouth	Away
Mar. 18	Intercollegiates	Syracuse

FRESHMAN BOXING

Feb. 3	New Hampshire	Away
Feb. 13	Yale	Away
Feb. 27	Harvard	Home

GYM

Feb. 12	Navy	Home
Feb. 20	Bowdoin	Away
Feb. 27	Princeton	Home
Mar. 4	N. Y. U.	Away
Mar. 5	Temple	Away
Mar. 12	Dartmouth	Away
Mar. 19	Springfield and Army	Home
Mar. 26	Open	
Apr. 2	Intercollegiates	Away

LACROSSE

Apr. 2	Boston Lacrosse Club	Home
Apr. 8	Harvard	Home
Apr. 15	Brown	Home
Apr. 28	Boston University	Home
Apr. 30	New Hampshire	Home
May 7	Boston Lacrosse Club	Home
May 14	Dartmouth	Away
May 21	Navy	Away

TENNIS

Apr. 16	Harvard	Away
Apr. 20	Williams	Home
Apr. 29	Tufts	Away
Apr. 30	Amherst	Away
May 6	Boston University	Away
May 7	Holy Cross	Away
May 11	Boston College	Away
May 13	Wesleyan	Away
May 14	Brown	Away
May 20	Dartmouth	Away

ADVERSARIA

Honored

¶ ERNEST A. GRUNSFELD, JR. '18, by receiving the medal of the Chicago Chapter of the American Institute of Architects. This medal was given in recognition of the plans he drew for the \$1,000,000 structure in Grant Park. Mr. Grunsfeld was also the designer of the Adler Planetarium.

Elected

¶ SANFORD E. THOMPSON '88, to the Presidency of the Taylor Society, which is "an international society to promote the science and the art of administration and of management." Mr. Thompson has also been made a member of the National Association of Manufacturers' Committee on the 1932 platform on American Industry, and a member of the Elimination of Waste Committee on the National Construction Conference. Aside from these honors, Mr. Thompson received a formal invitation from President Hoover to attend the President's Conference on Home Building and Home Ownership.

¶ GEORGE E. HALE '90, to the Presidency of the International Council of Scientific Unions, the new name for the International Research Council.

Presented

¶ To the Alumni Association of M. I. T. a watercolor, executed by the late EDMUND W. KINGSBURY '83. This gift comes from his widow, Mrs. Helen O. Kingsbury.

¶ To the Maryland State Conservation Department, by Mrs. T. Coleman du Pont, *The Tech*, \$100,000 steam yacht belonging to her late husband ('84). This is to be used as the flagship of the patrol fleet in the protection of Maryland's oyster beds.

Appointed

¶ LOUIS S. CATES '02, to head a committee of the American Mining Congress. This committee has been formed to consider steps for stabilization of the mining industry.

¶ FREDERICK L. GAMAGE, JR., '17, acting headmaster of Pawling School, by his father, Dr. Frederick L. Gamage, the founder of the school.

¶ WILLIAM J. MILLER '22, Head of the Electrical Engineering Department of the University of North Carolina.

Spoke

¶ KARL T. COMPTON, President of the Institute, at the annual meeting of the American Society of Mechanical Engineers on December 2.

¶ JAMES I. BANASH '06, before the American Hospital Association, Toronto, on October 1. Mr. Banash, who is Vice-President of the National Safety Council, read a paper on "The Widening Field of Oxygen Therapy."

¶ HAROLD S. OSBORNE '08, before the San Antonio section of the American Institute of Electrical Engineers, on November 24. Mr. Osborne, who is a noted transmission engineer for the American Telephone and Telegraph Company in New York City, spoke on "International Telephone Service."

¶ STUART D. CHASE '10, at the Louisville (Ky.) Public Forum, on November 22, on "Nemesis of American Business."

Invented

¶ By ALFRED L. LOOMIS, Life Member of the Corporation, and Dr. E. Newton Harvey of Princeton University, a new type of microscope. With this instrument biologists will be able to observe, for the first time, the changes taking place within living cells when they are whirled about at speeds between 10,000 and 12,000 revolutions a minute. The principle of the microscope is somewhat similar to that of a motion picture projector. It transmits to the eye a series of images with such regularity and rapidity that they blend into a steady, continuous picture. Hitherto scientists have been unable to witness and measure the various steps in the deformation of cells and in the movement of particles within them when the cells were whirled rapidly. Now, with the new microscope, the observer is presented a clear, steady picture of it throughout the process.

Written

¶ By FRANCIS R. HART '89, a book "The Siege of Havana," published by Houghton Mifflin Company. Mr. Hart is a Life Member of the Corporation and a member of its Executive Committee.

¶ By CHARLES H. PORTER '02, an article entitled "A Comparison of Public and Private Electric Utilities in Massachusetts." This was published in the November issue of the *Journal of Land and Public Utility Economics*.

¶ By OTTO C. LORENZ '18, an article entitled "Time Sales in the Furniture Trade," published in the November issue of *Furniture Index*.

¶ By DAVID O. WOODBURY '21, a book "Communication," published by Dodd Mead and Company.

Concerning Dr. Tryon's Trip

¶ GEORGE R. NORTON '07, of San Francisco, sent in the following letter about Dr. Tryon, Director of Admissions at the

Institute, who is now visiting schools and colleges in the west: "We feel that you will be interested in the details of Dr. Tryon's visit to Northern California and I am writing to acquaint you with them.

"The original plan included a trip to Reno, Nev., prior to the California contacts, but when Dr. Tryon arrived in Sacramento Sunday night, November 15, he decided not to go on to Reno because the super-efficiency of the Alumni in Oregon had arranged so many contacts for him up there that he was badly in need of a rest. Instead of going from Sacramento to Reno and returning to Sacramento as he had planned, he secluded himself in a hotel in Stockton for a few days' rest and cancelled his Sacramento engagement which was at the Junior College, on Tuesday, November 17. We got in touch with him from San Francisco when we found this out and learned that he would proceed with the program arranged on Wednesday, the 18th, which was a visit to the Modesto Junior College being conducted there by Fred Harvey '93 who lives near Stockton and had volunteered to attend to the contacts nearby.

"On Thursday, November 19, he visited the College of the Pacific at Stockton and was picked up that afternoon at three o'clock by the writer according to arrangements made by telephone. He came to San Francisco that evening.

"Friday, November 20, we first called on the deputy superintendent of schools in San Francisco to outline details for San Francisco school contacts and then kept an appointment at the San Mateo Junior College, 17 miles south of San Francisco, where he met a group of eight men teachers particularly interested in University work. After this contact, Dr. Tryon was driven back to the city and shown some of the outstanding features, such as, the Golden Gate, Presidio Reservation, and so on.

"... Saturday noon Dr. Tryon and I left for Galt, which is 22 miles north of Stockton and about 100 miles from San Francisco, where he had been invited to spend the night and Sunday following in a very interesting setting. The aforementioned Fredricho Harvey lives on a typical California ranch, officially known as *Rancho San Jon De Los Moquelumnes*. We were very much interested in the history of this ranch and learned that Señor Harvey's father was a practicing physician in the Middle West and had come to California with the gold rush about 1850, settling in Hangtown, now Placerville, where he practiced on the fractured skulls and broken noses of the '49'ers for about ten years. During this time he made a trip south to the vicinity of Sacramento and Stockton and noticed that the soil in the area known as the

Delta, where the Sacramento and San Joaquin rivers unite and flow into the bay, was very rich and he made arrangements then to become owner of the 3,000-acre ranch above mentioned, taking the title of same from the Spanish owner at that time. About 1862 he took up his residence on this ranch and we were privileged to spend the night at the home of Brother Harvey, his charming wife, and sister. This gave Dr. Tryon a very interesting opportunity to become acquainted with a typical ranch, having an atmosphere of early California, snow-capped Sierras visible about 40 miles to the east, and the Coast Range about the same distance to the west.

"Sunday, arrangements had been made for the Alumni in Sacramento, Stockton, Oakland, and San Francisco to journey to the ranch for the day, some bringing their families, and a very pleasant informal gathering was had. They returned to San Francisco Sunday night.

"Monday morning an appointment at the Oakland Technical High School at 8:40 gave Dr. Tryon an opportunity to talk with a group of student councilors and some of the students interested in engineering education, a meeting which was all too brief for the interest evidenced, for we had to journey on to keep a series of appointments at the University of California at ten o'clock. At the University, Professor Ernest A. Hersam '91 and Professor Charles G. Hyde '96 saw to it that Dr. Tryon had lunch with the Faculty and President of the University and made other very valuable contacts during the time. They brought him to the alumni dinner in San Francisco at six o'clock.

"This letter is written as we are about to start for a day at Stanford University, 30 miles south of San Francisco, where the first engagement is a luncheon as guest of the engineering school faculty, arranged by Professor H. W. Stebbins '02 of the engineering school, through Dean Hoover, the head of the School of Engineering. The remainder of the day will be spent with various contacts and inspection of Stanford University. On this pilgrimage Dr. Tryon is accompanied by the President of our local Alumni Association, J. E. Woodridge '93 and myself.

"Wednesday morning, Dr. Tryon had two engagements to speak to the high school teachers and students in San Francisco and left right after that for Thanksgiving at Monterey and Del Monte. He then expects to go on to Santa Barbara and Los Angeles.

"Dr. Tryon has expressed himself as finding the trip very interesting and worthwhile, learning that the universities and schools west of the Rockies are an educational group with slightly different viewpoints from those in the East."

Deaths

☞ Reports have come to The Review since the last issue, of the decease of the following:

☞ CLARENCE L. E. MOORE, Professor of mathematics at Technology since 1904, on December 5, after a long illness. Pro-

fessor Moore was internationally known for his original researches in advanced geometry, particularly the properties of the sphere, of the circle, and of spaces of higher dimensions than three. Professor Moore was a graduate of Ohio State University in 1901 and received his A.M. and Ph.D. at Cornell University in 1902 and 1904. His training covered both pure and applied mathematics. From time to time he spent considerable periods of study at Gottingen, Turin, and Bonn.

During the past decade Professor Moore devoted much of his time to teaching the theory of aerodynamics in the course in aeronautical engineering. He had been in executive charge of Course IX, the course of general science and general engineering, and was also a leader in establishing and editing the research *Journal of Mathematics and Physics* published by the Institute.

He was a member of a number of scientific societies in this country and abroad, including a fellowship in the American Academy of Arts and Sciences, a member of its Council and its Committee on Permanent Funds.

☞ FRANCIS R. ALLEN '78, on November 7, at Boston. Mr. Allen organized the architectural firm of Allen and Collins. Among the buildings which the firm designed were the Leslie Lindsay Memorial Chapel, eight buildings at Williams College, 12 at Vassar, Union Theological Seminary's group in New York, and Andover Theological Seminary's group in Cambridge. Mr. Allen was a member of the American Institute of Architects, the International Congress of Architects, the Boston Society of Architects, the Boston Society of Colonial Wars, and the Society of Mayflower Descendants.

☞ JOSEPH N. BULKLEY '89, October, 1931. After graduation, he joined the staff of the General Electric Company and served with them for several years, eventually being selected, in 1897, as consulting electrical engineer to the General Mining and Finance Corporation of Johannesburg, South Africa, in which capacity he was responsible for the equipment of the various mines of this group with the most efficient plants on the Reef. In 1913 he returned to America and designed and erected the plant and equipment of the Hollinger mine and also several others in Northern Ontario and Quebec. At the time of his death his headquarters were in Rhodesia where he was engaged as a consulting engineer.

☞ ALEXANDER J. DELANO '90, on May 5, 1931, at his home in Los Angeles.

☞ ATHERTON LORING '90, on November 1. Mr. Loring was President and Treasurer of the George McQuesten Company, lumber merchants.

☞ HENRY H. WAIT '91, on November 16, at his home in Chesterton, Ind. Mr. Wait was the inventor and patentee of the Wait turbo-generator and the designer and builder of the Wait "Bulldog" steam turbines and Wait "Bulldog" dynamos. He was a member of various engineering societies, including the American Society of Mechanical Engineers, the American

Society of Electrical Engineers, and the Société International des Electriciens in Paris.

☞ RICHARD WATERMAN '92, on November 16, at his home in Washington, D. C. For many years Waterman had been Secretary of the Transportation Division of the United States Chamber of Commerce. (A detailed account of his life may be found in the class notes of '92.)

☞ ERNEST C. KLIPSTEIN '94, on November 8. Mr. Klipstein was an architect and for many years he was a partner in the firm of Klipstein and Rathmann of St. Louis. He was a fellow of the American Institute of Architects and had served as President of its St. Louis chapter.

☞ JOHN F. BACON '97, on November 7, at New York City. Mr. Bacon was supervising architect in the building of the Grand Central Terminal and the new Waldorf-Astoria Hotel.

☞ NEWTON D. BENSON '99, the latter part of November, at his home in Providence, R. I. In 1906 Mr. Benson formed his own construction business, which he carried on for a quarter of a century. He was a past President of the National Concrete Products Association; a member of Royal Arcanum, the American Society of Civil Engineers, and also of the American Concrete Institute.

☞ CHARLES W. CORBETT '99, on June 3, 1931.

☞ ABEL M. HAMBLET '02, on June 7, 1931. For several years before his death, Mr. Hamblet was Director of Research for the H. W. Johns-Manville Company of Manville, N. J.

☞ MABEL K. BABCOCK '08, on December 3, at Boston. Miss Babcock designed the President's garden at the Institute, the planting around the Arlington Street Church, and portions of the grounds at Wellesley and Bates Colleges. She was former instructor in horticulture and landscape architecture at Wellesley College, a director of agricultural courses at Lowthorpe School, and President of the M. I. T. Women's Association. She was a member of the A. S. L. A., Massachusetts Horticultural Society, Farm and Garden Association, and the Zonta Club. She also had the honor of being a member of President Hoover's conference on home building.

☞ CEDRIC S. ANDERSON '11, on November 13.

☞ JOHN J. DEVLIN '11, on October 10. For several years preceding his death, Mr. Devlin had been assistant to the President of Manning, Maxwell and Moore, Inc., of New York City.

☞ ELMER B. LAWSON '27, on October 8. After graduation he had been an assistant engineer associated with the Randolph-Perkins Company in Chicago, and assistant engineer in the employ of Theodor Brent, New Orleans.

☞ WILLIAM K. ROBBINS, former professor at the Institute 1879-82, on November 26, at Manchester, N. H. At the time of his death he was a member of the New Hampshire House of Representatives, and for 44 years, until his retirement in 1926, was chief chemist and colorist in the mills of the Amoskeag Mfg. Co.

NEWS FROM THE CLASSES AND CLUBS

1868

I send you as class news a copy of a letter written by me in 1854. It is the earliest letter that is in existence at the present time. It is written from Gardiner to George H. Richards, Sing Sing. "Dear George: Six chickens have died. Mrs. Feran and Harry found a nest of little mice in the new barn. We have had a large bonfire on Orchard Hill and papa burnt up his coat. Saturday, I had some potatoes. Sanie (my sister Sarah) and I made a border of sods round our garden. We have had a little calf. Mr. Welch took it away. Yr. Aff. Bobby."

The above letter is not dated, but from statements in it, I feel sure it was written in 1854 when I was 10 years old. I regret that it cannot be reproduced in the form of an exact copy of the handwriting. — ROBERT H. RICHARDS, *Secretary*, 32 Eliot Street, Jamaica Plain, Mass.

1877

Our classmate, Kittredge, should feel very honored by the following letter which he received from the American Society of Civil Engineers: "I have the honor and pleasure to inform you of your election on October 5, 1931, as an Honorary Member of the American Society of Civil Engineers. The Constitution of the Society provides that: 'Honorary Members shall be chosen only from persons of acknowledged eminence in some branch of engineering or the sciences related thereto.' . . . Permit me to add my sincere congratulations to you on this election. . . ." The letter is signed by George T. Seabury, *Secretary* of the Society. — BELVIN T. WILLISTON, *Secretary*, 3 Monmouth Street, Somerville, Mass.

1882

Robert William Gilbert, F.A.I.A., for many years a member of the firm of Charlton, Gilbert and Kuenzli, prominent architects of Marquette, Mich., and Milwaukee, Wis., died at his home on Major's Island, Sheffield, N. B., July 29, 1927. He was born at Burton, N. B., March 24, 1854, the only son of William J. Gilbert, Judge of Probate, and Myra Mowat, his wife.

In preparing for his profession he studied at the University of New Brunswick and the Massachusetts Institute of Technology, where, for a year, he was associated with the Class of '82 in the special course in Architecture. He also had valuable experience as a draftsman in the office of Hartwell and Richardson, Boston architects, before going to Technology; and after completing his studies there he was with Rotch and Tilden for about five years. Mr. Rotch of that firm took a friendly interest in this brilliant young student and advised him to go abroad for travel and study. He therefore

went to Europe and for two years spent his time traveling and sketching, and one winter attended the École des Beaux Arts in Paris.

On his return to Boston he formed a partnership with James Means '85, which lasted till May, 1890, when he moved to Marquette, Mich., and became a partner of D. Fred Charlton, F.A.I.A.E.O. Kuenzli, A.I.A., was taken into the firm later, and a branch office opened at Milwaukee, Wis. During the years that followed Charlton, Gilbert and Kuenzli had a large practice and many of the best public and private buildings in Michigan were designed by them. Among these may be mentioned the Upper Peninsular State Hospital for the Insane, at Newbury, Mich., an interesting and well designed group of over 20 buildings, with appropriate landscape setting; the Marquette County Courthouse; a number of school and college buildings, churches, banks, theaters, and private residences.

While connected with the firm, Gilbert did most of the designing for it. He was popular throughout the district and prominent in social and public affairs. In 1904 he retired from the active practice of architecture and returned to New Brunswick, the land of his birth.

Owning a part of Major's Island in the St. John River, he built a cottage thereon and interested himself in establishing a small herd of Jerseys, gardening, painting in water colors, and sailing on the river in his yacht *The Mist*. Here he spent the remaining years of his life.

His death removed a man who possessed unusual charm and ability, and who had a wide circle of friends. He is survived by his wife. — ALFRED L. DARROW, *Secretary*, 13 Garrison Road, Brookline, Mass. RACHEL P. SNOW, *Assistant Secretary*, Box 625, Falmouth, Mass.

1884

At the luncheon of the Washington Alumni Society, October 16, Dr. H. W. Tyler gave an account of his recent visit to England, with particular reference to the Centenary Meeting of the British Association for the Advancement of Science held in London in September. This was preceded by a Faraday Celebration and followed by a Commemoration of the 100th Anniversary of Maxwell's birth.

The Faraday Celebration included meetings in different cities in Great Britain and flood lighting of public buildings. At the principal meeting in Queens Hall, addresses were made by the Prime Minister and others. An exhibit of electrical appliances, based on Faraday's discoveries, was held in Albert Hall, with a reproduction of his simple laboratory at the Royal Institution.

The first event in the program of the British Association was the reception of delegates from all over the world by the

President, General Smuts of South Africa, supported by a distinguished group of past Presidents, including Sir J. J. Thomson, Sir Oliver Lodge, and others. Among the delegates was C. G. Abbot '94 of the Smithsonian Institution. In the extraordinarily varied and interesting program of the following days, one of the most interesting sessions was a discussion meeting of Section A, Mathematics and Physics, on the evolution of the universe. The participants included Jeans and Edington, of Cambridge; Milne, of Oxford; De Sitter, of Holland; Lemaitre, of Belgium; Millikan, of Pasadena, Calif.; Lodge, of Birmingham; General Smuts, and the Bishop of Birmingham. The last three, having given the discussion a rather philosophical turn, were courteously reminded by Jeans that it was not a meeting of the British Association, but of the Section of Mathematics and Physics, which they were addressing. The audience at this discussion, which lasted from 10:00 until after 1:00, numbered several thousand.

Dr. Tyler was also present at the unveiling of tablets to Faraday and Maxwell in Westminster Abbey, with a very interesting address by Sir J. J. Thomson, as Master of Trinity College. The distinguished group present at this ceremony included from the United States, Messrs. Millikan, McClenahan, Abbot, and the late Dr. Stratton. A visit to the National Physical Laboratory at Teddington was briefly described. — AUGUSTUS H. GILL, *Secretary*, Room 4-053, M. I. T., Cambridge, Mass.

1888

Charles A. Stone made a trip to Norway and Sweden last summer in his own private cruising yacht. His graphic description of his cruise, given below, will be of great interest not only to his classmates but to all Technology men: "I was aboard the *Argosy*, which was built for me last year by the Krupp Company in Kiel, and we cruised first up the east coast of Sweden stopping along the way, and then down the coast and up to Oslo, from Oslo around Norway and up the west coast as far as Trondhjem. The total trip occupied about two months and in all we covered 5,000 miles and stopped over night in 46 different ports during the two months.

"Sweden is interesting from many points of view, not the least of which is that of her industries. She has now developed some great industrial establishments like Kreuger and Toll, the Gas Accumulator Company, and others, and has many technical men working on the application of scientific principles to industry. There is at Uppsala a great educational institution of very old standing which compares favorably with the leading colleges and technical schools in the United States."

1888 Continued

"The Gas Accumulator Company, so-called, has developed the art of furnishing light from compressed gas to such an extent that today the lighthouses, occulting buoys, street lights, and traffic flashes for practically every nation of the world are built by this company either in Sweden or under its direction in other parts of the world.

"Kreuger and Toll manufactures more matches than all the other match factories in the world put together. There are other illustrations of similar organizations, but the only one which I need mention is the S. K. F. Ball Bearing Company, which is one of the largest manufacturers in the world of steel balls used for roller bearings. This company has now grown into an enormous organization, furnishing a very considerable portion of all the balls used in the bearings for motors, railroad cars, and mechanical devices everywhere.

"Sweden has another point of interest which no other country possesses to the same extent. A thousand years ago, the Vikings developed a civilization and a capacity for navigation which for many years no other country equaled. Today it is interesting to see the relics of their early ships, and the great burial mounds which the Vikings erected in memory of their leaders. When a powerful Viking died he was buried beneath a great mound of earth with all his worldly goods, including his ship. Near Uppsala there are three great mounds under which were buried centuries ago men who had led these hardy sailors thousands of miles across the oceans in the small but seaworthy ships that they had skilfully built. The Swedish and Norwegian Vikings were undoubtedly the first white people to land on American shores and there are many authentic accounts of these early trips. The Swedes are still a seafaring people, but the recent generations have not been as outstanding in their accomplishments as were their forbears. Sweden is blessed with many inland waterways which immensely facilitate transportation. In addition, there are now excellent roads which make travel by motor comfortable and easy.

"Norway is devoted more largely to agriculture than Sweden, but since the development of electric power plants throughout the country her manufacturing industries have grown; and I know of no other country where the domestic use of electric power is carried to the extent that it is in Norway. Many of her plants are owned either by the government, or the district, or the city in which they operate. The plants are well designed, well built, and equipped with modern machinery. Much of the machinery is of either German or Swiss manufacture, but I saw a few power stations equipped with American and one or two with English machinery. Power lines run everywhere and even in the sparsely settled regions among the mountains you will often find small houses and barns way up on the mountains provided with electric lights, electric cream separators, and even with electric heating. I found several cases

where the farmer said that he expended more per annum for his electric power and light than he did for any other single purpose. Most of the people are poor, those employed getting a very low wage, and the rates charged for electric light and power appear to us ridiculously low.

"Oslo, which was formerly Christiania, is one of the largest and most interesting cities in Norway. It is modern in aspect and compares favorably with Stockholm.

"While I was in Norway there was less industrial activity than usual on account of the fact that a general strike of the workmen was in force. It was said that this strike was developed and fostered by Russian propaganda, but I do not know whether this is so or not. At any rate, the wages for which they were contending were a mere pittance compared with what similar classes of labor would receive in this country. The Norwegians seemed happy and contented, so far as I was able to see, strikers looked upon the situation as an opportunity for a vacation. The average, prosperous person receives only a few hundred dollars a year and all seem well housed and able to live happily and contentedly. The Norwegian days are marvelously long in summer and very short in winter. The people live out-of-doors a great deal of the time, are very athletic, and fond of boating, swimming, mountain climbing, and skiing.

"The country is beautiful beyond description. Fjords at frequent intervals along the coast penetrate for many miles back into the mountains. The Sogne Fjord and the Hardanger Fjord are among the most famous. The Sogne Fjord runs for 150 miles back into the country and terminates beneath a glacier some hundreds of feet above the sea level. There are many places where a ship cruising up this fjord goes so close to the shore that one could easily throw a ball against the cliffs that form its side. In some places mountains tower 5,000 feet, almost perpendicularly from the water's edge. The beauty of the scenery is enhanced by frequent waterfalls and beautiful green slopes with farms dotted all over them. The farmhouses and barns are low and compact, with sodded roofs in summer, often overgrown with all sorts of weeds and flowers.

"With the exception of Alaska, I know of no country which I could compare with Norway and Sweden. Alaska has grander fjords and greater glaciers, but the country is less beautiful and, of course, Alaska lacks the charm of Norway's little old villages which have existed for thousands of years."

Sanford E. Thompson was recently elected President of the Taylor Society, which is "an international society to promote the science and the art of administration and of management;" he was also made a member of the National Association of Manufacturers' Committee on the 1932 Platform on American Industry, a member of the Elimination of Waste Committee of the National Construction Conference, and last, but not least, he has just received a formal invitation from President Hoover to attend the Presi-

dent's Conference on Home Building and Home Ownership. Sanford says that his firm finds "in the line of management engineering that many manufacturers are looking for a review of their business or for advice as to how they can reduce manufacturing costs or can increase profits through better marketing." Also, their construction and research engineering practice, largely through the skill of the Vice-President, Miles N. Clair, M. S. '23, has been increasing during the past two years with clients scattered all around the country.

The Boston Evening Transcript of November 16 has the following to say about one of our co-eds. "Miss Isabel F. Hyams, chairman of the Boston Tuberculosis Association Sheltered Workshop at 35 Tyler Street, plans a Christmas bazaar to be held in the workshop rooms on Wednesday, December 2. Begun as a venture a year ago to provide suitable work under strict medical supervision for former tuberculous patients in Boston, it now gives employment to from 30 to 40 men and women who otherwise would be unemployed."

Most of us remember when our '88 champion football team went to Amherst and defeated the Lord Jeffs 60 to 0 and our classmate Charles Hammond (Oliver) Cromwell, with his 220 pounds, returned from that game with a badly torn ligament which confined him to the hospital for several weeks. We have just learned of the death of Oliver, as some of us loved to call him. His passing came rather suddenly on the night of October 21 after having been in the Johns Hopkins Hospital only a few hours. He had been in rather poor health for some time, but his death was unexpected. He was able to move about, drive his car, and maintained his cheerful disposition until the end. Cromwell was formerly President of the Lafayette Mill and Lumber Company and at the time of his death he was a director of the Baltimore Brick Company, and Vice-President and director of W. K. Cromwell and Company, Inc., formerly the Gandy Belting Company of Baltimore. He is survived by his wife, Mrs. Nellie Brown Cromwell, a son, Charles Hammond Cromwell, Jr., and six brothers and sisters.

Fred Nichols, our country-circling traveler, reached Kansas City November 18, having covered 15,000 miles with Mrs. Nichols in his trusty Willys-Knight since starting from Chicago on December 31, 1930. His letters are full of interesting experiences but we have space to touch only a few of the high spots. They spent one night in Needles, on the line between Arizona and California, in a closed room of an air-cooled hotel. The windows had to be kept closed and Mrs. Nichols nearly smothered. The temperature in the room was 90° all night. A few quotations from Fred's last letter follow: "Mount Rainier gave us one of our most appreciated experiences, thanks to the farsightedness of the government. The remarkable engineering feat accomplished in furnishing the wonderful road up this mountain puts every autoist in possession of sights

1888 Continued

and scenes that rival any we have experienced. The regular highway took us in sight of the front of a glacier only a quarter of a mile away. After leaving Florida on March 25 till we reached Salt Lake City, 8,800 miles, we never saw a soul we had ever seen before. In Salt Lake we saw one, and in Denver I looked up Ladd '88 and Shepard '87, our old brigadier general or something of the sort. Ladd was in his shirt sleeves with some kind of engineering problem on his drawing board, and Shepard was 'behind the bars' where he has charge of the United States Mint. Some day I hope to meet you in New England, say in Maine at the Great Chebeague Golf Course, and talk it over with you. I played golf in Galveston, San Antonio, Cisco (Texas), Santa Monica, Portland, Denver, Kansas City, and Williams, Ariz., near the Grand Canyon, where they bring all their water 60 miles in tank cars. At the fourth hole in Williams I refreshed myself by a drink from the canvas water bag hanging on a tree." Nichols says they had to stop and rest so much that they got way behind on their schedule. Only had three days in Canada at Vancouver and Victoria, giving up all attempt to see Banff and Lake Louise. They also abandoned their plan to tour New England and the Maritime Provinces. By this time Nichols is back in Chicago "teaching the young idea how to shoot." — BERTRAND R. T. COLLINS, Secretary, 18 Athelstane Road, Newton Center, Mass.

1890

Mr. Calvin W. Rice has completed 25 years as Secretary of the American Society of Mechanical Engineers, with his headquarters at 29 West 39th St., New York. At a meeting held in New York, December 2, in fitting recognition of his splendid service, a testimonial to him occupied an important place in the program, when an honorary membership in the Society was conferred upon him. Cal came to the society with a splendid record of engineering achievements, a fine showing of accomplishments in this field, and the high ideals of the position the engineering profession should fill.

In a recent issue of the Belmont *Citizen*, the town where our classmate Charles W. Sherman lives, and where he is Chairman of the Water Commissioners, is a most interesting article on his industrial career and the work he has done for the town. He has been made an honorary member of the New England Water Works Association at their Fiftieth Convention early in October. A most interesting article written by Charlie appeared in the *Engineering News-Record* of October 24 entitled "Great Hydraulic Engineers in New England Classic Period."

Dr. George E. Hale has been elected President of the International Council of Scientific Unions, the new name of the International Research Council. He succeeds M. Picard. Sir Henry Lyons remains general secretary.

At a meeting of the New England Section of the Advertising Federation of America, at the Hotel Biltmore in Provi-

dence, Pierre S. du Pont was one of the speakers. He said that "the influence of our prohibition law upon business cannot be but malign. Business is burdened with taxes, but the revenue from sale of intoxicating liquors is not only lost, but is now diverted into channels to feed illicit gangs and promote lawlessness. This must cause a continuing adverse influence upon our business future."

A card was received from Mr. and Mrs. Darragh de Lancey, in October, from Stockholm, where they were enjoying that delightful city. After a few weeks motoring through Germany he hopes to return home for his winter's work.

We are pleased to announce that George A. Packard was married to Miss Myrtle Swain Foster, August 27. We hope to have the pleasure of meeting her at the Alumni Dinner in February, if not before.

We regret to announce the death of our classmate, Atherton Loring, at the Deaconess Hospital on November 1. Atherton was taken there about two weeks before for an operation, but did not survive. He was President and Treasurer of the Geo. McQuestion Co., lumber merchants. He was also President of the Bay Farm Co., director of the Mass. Lime & Cement Co., and a director in the Atlantic Co. Many of you will probably remember that at our Thirty-Fifth Reunion at the Cape in '25, we stopped at Atherton's summer home in Duxbury and had the pleasure of meeting him and his family.

A note under date of November 10 was just received from Norman G. Nims of New York, advising your Secretary of an experience he had one Saturday afternoon early in October. He spent less than two hours in Boston, but while there met Willis R. Whitney on the street; a little later he met Atherton Loring, and states that at that time Atherton felt full of hope for better things in a business way at an early date; shortly after that he ran into Frank Kendall for a chat. That is certainly going some, after spending scarcely two hours in Boston, and picking up three classmates. We hope next time Norman returns to Boston, he will at least make an attempt to telephone to his Class Secretary, who will be only too glad to see him again.

Capt. Ernest H. Brownell finished his 24-day visit to Egypt, then 31 days in Greece, and short stops to many other places on the Mediterranean coast. On his return home, he started out for a cruise in his own little boat and went down the canals, the Delaware and Raritan, and Chesapeake, to Norfolk, Va., and then back home; then took another short cruise to Nantucket. Ernest writes he will probably now stay put for about a year, and is at his home, 2 Sea View Ave., Newport, R. I. Having reached the age of retirement in our Navy, he is now enjoying life at home in this quiet way.

Philip M. Hammet's address is now 3919-49th Street, Long Island City, N. Y. This is the first word we have had from Philip for many years; and as your Secretary often says, if any of you come to

Boston at any time, do not hesitate to get in touch with him at once and we can have a little gathering together.

We regret to announce the death of our classmate, Alexander J. Delano, on May 5, at his home, 141 North Anita Ave., Brentwood Heights, Los Angeles, Calif.

Leonard C. Wason, President of the Boston Chapter of the Associated General Contractors of America, was the speaker at the luncheon of Course XVII held at the Riverbank Court Hotel, November 20. Leonard's subject was "The History of the A. G. C." — Dr. George E. Hale of Pasadena, Calif., spent a week-end the latter part of October with Harry Goodwin in Brookline. George was on, in relation to the 200-inch telescope lens now being made. He was too busy even to call up his Class Secretary.

In a recent issue of the *World's Work*, Professor William Z. Ripley, professor of transportation at Harvard, and formerly a member of the Interstate Commerce Commission, asserted in a long article, that railway wages must be reduced immediately to enable the carriers to meet their financial emergencies. On Sunday evening, November 22, Billy spoke over the radio in the "Collier Hour," giving a talk on the railway situation and showing the necessity of the employees accepting a reduction in wages. — GEORGE L. GILMORE, Secretary, 57 Hancock Street, Lexington, Mass.

1892

The committee appointed to arrange for the celebration of our Fortieth Anniversary is not ready to report definitely on the date and place for the Reunion, but it will undoubtedly be a week-end the first part of June and at some place in the southeastern part of Massachusetts. Make tentative plans accordingly. The following letter was sent to me by Albert P. Mathews: "Richard Waterman, IX, died of a blood clot after a brief illness in Washington, D. C., November 16, 1931. For many years Waterman had been Secretary of the transportation division of the United States Chamber of Commerce and was widely known in this connection. Just before his death he had been working at very high pressure seeking to have established an Institute of Transportation, for consideration of all the problems of the transportation of goods and persons. He had made good progress toward its realization, and it is hoped that the impetus he gave to the project will lead to its accomplishment, even in the absence of his strong advocacy of it. It had been for many years a dream, for the realization of which he had worked to the utmost.

Waterman's life after leaving Technology was devoted to executive duties. At first connected with the educational exhibits at the World's Fair in Chicago in 1893 and later with that of the United States at the Paris exposition, he became much interested in education and was for a few years teacher in and later a principal of one of the Chicago public schools. Afterwards he became secretary of Mr. E. A. Filene of Boston and after that superin-

1892 Continued

tendent of a Philadelphia hospital. Later, when the U. S. Chamber of Commerce was organized, he became the Executive Secretary of the transportation division, one of the most active departments of the Chamber, a position which he held until shortly before his death, when he was transferred to the Research Division of the Chamber. For several years he had suffered from a badly dilated heart and his sudden death was not unexpected, for he did not allow his activity to be diminished by the knowledge that that activity would probably be interrupted.

"His life was a full, active, and useful one. He maintained throughout that urbanity of manner, kindness of heart, keen sense of humor, and integrity of character which marked him out when he was our fellow student.

"He married, in 1898, Miss Grace E. Mathews of Chicago, a sister of mine, who survives him together with one son, also called Richard Waterman. Waterman was a descendant of an old Colonial family of Providence, R. I., his ancestor, also called Richard Waterman, settling there early in the Seventeenth Century." — JOHN W. HALL, *Secretary*, 8 Hillside Street, Roxbury Crossing, Mass.

1895

Although economic conditions are experiencing protracted, general readjustments, there is no reason why this condition should affect '95 class news.

Spread a little optimism. Write your secretaries what you are doing and what you are thinking about, and the "picture will be painted" in rosy colors. Get busy, and trust us. — LUTHER K. YODER, *Secretary*, Chandler Machine Company, Ayer, Mass. JOHN H. GARDINER, *Assistant Secretary*, Graybar Electric Company, Graybar Building, New York, N. Y.

1896

Charlie Hyde has sent in the story of his Japanese trip, which is so excellent that it is given in his own words.

"On June 5 Mrs. Hyde and I embarked from San Francisco on S. S. *President Johnson* for a trip to Japan. We were the guests of the Dollar Steamship Lines, Inc., Ltd. I was a member of a commission of four (two medical officers and two sanitary engineers) appointed to study the health and sanitary conditions affecting steerage passengers en route between the oriental ports of Manila, Shanghai, Hong Kong, Kobe and Yokohama, and the American ports of Honolulu and San Francisco. The problem concerned Filipino passengers particularly; and of these, especially the laborers bound for the Hawaiian sugar plantations under contract with the Hawaiian Sugar Planters Association. In 1929 and at other times, these groups were subject to meningitis and pulmonary infections, pneumonia and influenza.

"The remainder of the party proceeded to Manila, but Mrs. Hyde and I felt that we could not afford the time to go further than Japan.

"We had a most pleasant day in Honolulu, meeting several friends and seeing much of the city and its environs.

"We reached Yokohama on June 22 and had eight wonderful days in the Flowery Kingdom before taking the S. S. *President Johnson* on June 30 for the trip back to California via Honolulu.

"With some of our party, immediately after arrival in Yokohama, we drove to Kamakura and Katase. From Katase we walked across a long low bridge to charming Enoshima island, visiting the shops, watching the fishing boats, and enjoying the marine views. On our return to Katase we had luncheon in a Japanese inn with Japanese food served in native style. We sat on the floor and ate from a low table with chop sticks. As is the custom in such places, our serving maid sat at the head of the table as hostess. Also, as is the custom in Japanese inns, we left our shoes at the door and put on sandals. Even these were discarded as we entered our dining room, a second-story room with a superb view of Sagami bay and of Enoshima island. At Kamakura we saw the world-famous bronze Daibutsu (Buddha) and one of the more interesting Buddhist temples, Gion in.

"That afternoon we traveled by swift electric train to Tokyo from Yokohama, stopping at Omori to call upon some cousins of my sanitary engineering assistant, an American born Japanese, a graduate of the University of California. Here we had a chance to see one of the high-class Japanese homes, quite occidental in some respects, yet truly Japanese in others. We again left our shoes at the door and were provided with sandals, as is customary.

"At Tokyo we registered at the great Imperial Hotel, one of the finest and largest caravanserais of the East. In this truly cosmopolitan hotel, life is the same as in any similar grand hotel in Paris, Rome, Berlin, London, or New York. Our menus were in French and Japanese and the cuisine marvelous. Our room, with its fine appointments, was all that could be desired.

"From Tokyo we went to Nikko for the day, taking lunch at a fine European-type hotel with every modern comfort and convenience. We spent several hours (they should have been as many days) visiting the Shinto shrines which in many respects are unparalleled, even by those in Tokyo and Kyoto, and a great Buddhist temple. Nikko lies in a mountainous region of exquisite beauty. Here the huge cryptomeria trees are among the finest in Japan and most satisfying in their beauty.

"In Tokyo we saw much of the old and the new: old shrines and temples which carry one back to medieval times and earlier; new streets and new buildings which, except for the people themselves, make it difficult to realize that one is elsewhere than in a great modern American city.

"Our next stop was in Miyanoshita, a mountain village from which one may take an endless number of trips to view and to scale the incomparable Fujiyama. Unfortunately, we were in Japan at the beginning of the rainy season and it rained most of the two days while we

were in this district. Our hotel, the Fujiya, was one of the most comfortable which we were ever in, either in America or Europe. It would be difficult to describe its mirror pools, its large swimming tank supplied with warm water from the mountains, its fish ponds, magnificent gardens, and lovely rooms. The dining room is of especial interest. In its coved ceiling, containing 159 coffered squares, are exquisite paintings of 636 Alpine flowers of Japan, 507 birds, and 238 butterflies and moths, all made by famous Japanese artists.

"Leaving Miyanoshita we drove by bus to Lake Hakone, famous for its own beauty and for its vistas of Fujiyama, mirrored in its placid waters; and thence to Numazu, where we took a fine and very fast express train to Kyoto. On the way to Numazu we had an inspiring view of Fujiyama, one of only two glimpses of this mighty peak which, on account of the bad weather, we were privileged to have. We arrived late in the evening at Kyoto and registered at the Miyako Hotel. The following day we spent in shopping and incidental sightseeing.

"The next day, after further sightseeing in Kyoto, we went by train to Nara and stayed at a real Japanese inn, whose name, translated into English is Chrysanthemum Water Inn. It was situated in a beautiful garden on the shore of a little lake and at the very entrance of the famous deer park. Here, since it was off-season, we happened to be the only guests and were accorded the two rooms of highest honor. The meals, truly Japanese, were excellent. It was a delightful experience which we shall not soon forget: hot Japanese bath, sleeping mats on the floor, and all. The following day we visited the deer park, the Shinto shrine, and the notable bronze Daibutsu, fed the deer, rode in rickshas, and did all the usual and some unusual things.

"Returning to Kyoto, we spent a few more hours in Miyako Hotel and took the night train to Yokohama. Very early that morning from the train windows we had another superb view of Fujiyama while the rain clouds were dispersed from its summit for a few moments. We breakfasted in Yokohama's beautiful hotel, the New Grand. That morning we spent shopping and sightseeing and in the afternoon (June 30) we boarded the commodious S. S. *President Johnson* for the long voyage home.

"The rice-planting season was at its height during our stay. I think that I have never seen such industry as prevails everywhere in Japan, and perhaps especially in rural districts, where rice is cultivated.

"A visit to Japan is one of truly great interest. It would take many pages to describe the unusual sights of city and country life or of the beauties of nature which such a trip affords. But one should spend not eight days but eight weeks, at least, to really taste the joys and experiences of a sojourn in this country.

"On the outgoing and homeward voyages I was extremely busy making studies relating to the ventilation of the

1896 Continued

steerage compartments, to the accommodations afforded and to all those factors which affect the health and well-being of the steerage passenger. Our personal accommodations were luxurious: on the return trip, for instance, we occupied the so-called French suite. The cuisine on these ships is all that could be desired — too good, in fact, as the scales disclosed upon our return."

In a recent note from Mark Allen he said that he had been away on a western trip and wanted his best regards given to all the '96 fellows. Anyone who goes through Detroit without stopping to see Mark will be in his "black book."

Dan Bates had the misfortune to break his collar bone, so that he has been in the hospital in Philadelphia since November 8. The last report was that he expected to be out by the first week of December.

Further report from E. A. Lindenlaub, son of our classmate A. F. Lindenlaub, was that he would be leaving his job at Glouster, Ohio. He has secured the position of Assistant General Manager on one of the biggest coal stripping operations in Russia.

M. L. Fuller with Mrs. Fuller sailed November 30 for West Africa, making all the ports from Senegal to Angola. From the latter point they plan to cross Africa on the new road through the Congo, coming out at Beira in Portuguese East Africa and thence going down to Capetown and across to South America, coming home by the west coast. If they could make a connection, they would take one of the semiannual boats that go to the Falkland Islands around Cape Horn on the way to Valparaiso.

The Secretary missed Con Young when he called on November 9. He and Mrs. Young had left Bass River and were beginning their winter migration to the south, making stops at Worcester, New Haven, York, Pa., and Washington. They were going to see Lou Morse in York and would spend Thanksgiving in Washington.

Mort Tuttle reports that business is picking up with his concern, the Morton C. Tuttle Company. One of his present jobs is the new chemical and physical laboratory for Radcliffe College. He has also had a paper mill for the Champion Fibre Company at Canton, N. C. The big Wyman Dam at Bingham, Maine, developing 100,000 horsepower was completed by him six months ago, but the dedication has just occurred. In addition to these big jobs he has various engineering work and has also been very successful in developing a new field of cost engineering which covers the cost analysis of any design, including comparison of competitive designs from the viewpoint of cost. This work seems to be rapidly expanding.

Classmates may have read in the papers that George Burgess, director of the U. S. Bureau of Standards, suffered a slight attack of cerebral hemorrhage while presiding over a meeting of the Bureau chiefs on October 28. The latest report was that he was improving, but that he had not recovered the full use of his left side.

Gene Hultman is the latest addition to radio broadcasters in the Class. He went on the air the evening of November 12 and, as Police Commissioner of Boston, gave some very interesting facts regarding the operations and policies of the Department.

Eddie Mansfield, who is in charge of the Educational Department of the Edison Electric Illuminating Company of Boston, gave a talk before the Technology Student Branch of the American Institute of Electrical Engineers on November 19, the subject being "Electric Power, Its Generation and Distribution."

Frank Hersey is beaming even more than usual these days, the reason being the arrival of Paul Walker Hersey on Sunday, November 15, weight 6½ pounds. — CHARLES E. LOCKE, *Secretary*, Room 8-109, M. I. T., Cambridge, Mass. JOHN A. ROCKWELL, *Assistant Secretary*, 24 Garden Street, Cambridge, Mass.

1899

A short time ago I received a newspaper clipping concerning one Sammy Samuels who is the son of Edwin F. Samuels of '99, now of Baltimore, Maryland. The said Sammy has covered himself and the Class of '33 of the U. S. Naval Academy, Annapolis, with glory. On October 24 the Navy beat Princeton by a score of 15 to 0, and Sammy helped do it. He is a Navy sub, but the most effective ground gainer in the Annapolis lineup — at least that's what the "fan" said — and that's that for Sammy.

During a recent trip through New England I discovered that Tommy Robinson is now devoting his time to writing plays and is gaining some success. We most of us recall "Be Your Age," a product of Tommy's pen, which came out a couple of years ago. — In a little chat with Miles Sherrill who looked splendid and felt better even than he looked, I learned that he credits his well-being to playing golf in Marshfield in the low 80's all summer. That is a happy combination! Marshfield, he says, remains as delightful as when we held one of our early reunions there. "Low 80's" refers to Sherrill's golf score and not the temperature.

While in New York recently, I ran across Lew Emery. We had dinner together and I heard about his impromptu trip to Europe where he journeyed after deciding he wouldn't. He will spend the winter in New York where he is going on with his musical work.

While on a visit to Washington recently to see his brother who is the Director of the Bureau of Standards, Phil Burgess looked me up. We had only a moment to pass the time of day as Phil was on his way to points North. Shortly after seeing him I ran across W. S. Newell of Bath, Maine, who was in town on a flying trip and he hadn't much time to visit either. I hereby register a protest which I hope you '99 men will heed, and that is that you let me know when you are coming to town. We might have lunch together. We might even have a game of golf, because, George Priest to the con-

trary notwithstanding, I am in town for several days at a time — indeed! I once stayed here three weeks without making a trip out.

I was glad to hear from Hervey Skinner recently, though very much saddened by the news he sent me which was that Charlie Corbett had died on June 3rd last. — W. MALCOLM CORSE, *Secretary*, 810-18th Street, Washington, D. C. ARTHUR H. BROWN, *Assistant Secretary*, 53 State Street, Boston, Mass.

1900

Wilbur Davis, assistant chief engineer of the Transit Department of the City of Boston, in charge of the Boylston Street subway extension and the traffic tunnel to East Boston gives us a few words about the progress of his work. He writes: "Those who have occasion to pass through Governor Square and Beacon Street to the Brookline town line, either by automobile or by Boston Elevated surface cars, are aware, of course, that subway construction is in progress, but are not familiar with the magnitude or details of the work, nor of the difficulties encountered.

"The Boylston Street Subway is being extended under Chapter 394 of the Acts of 1930. It will pass under Governor Square and proceed along under Beacon Street, crossing under the Boston and Albany railroad tracks, where it will be 46 feet deep, to beyond St. Mary's Street in Brookline, where by an incline it will come to the surface. It will be about a mile in length. There will be another incline a little west of Governor Square for the Commonwealth Avenue cars.

"The work is being done, not by contract, but directly by the labor force of the Transit Department of the City of Boston, which is resulting in a large saving in cost to the city. There are now employed on this project a labor force of about 1,050 men, all Civil Service employees, physically qualified and practically all veterans and citizens of Boston. The work is carried on continuously in three shifts of eight hours each.

"The main difficulties encountered are the large amount of water, the depth necessary to pass under the Boston and Albany railroad tracks in Beacon Street and the depth necessary on account of the double deck crossing of the two lines in Governor Square, as there will be no grade crossing; also a large syphon sewer here which is to be built 65 feet below the surface of the Square, and the necessity of supporting the street surface over which pass the street cars and heavy automobile traffic while the deep subway is being dug and built below.

"The work is now about one-half completed and will cost about five million dollars. Completion will probably be in the spring of 1933.

"Another project by the Department now under way is the traffic tunnel between Boston and East Boston passing under the harbor. This tunnel will be about a mile in length and will be only for automobiles. It is now tunneled for about one-quarter of its length, the work

1900 Continued

progressing from the East Boston end toward Boston. A shield method is used in the construction. So far the work has been in free air, but from now on indications are that compressed air will be necessary for the remainder of the length. Out of sight, out of mind, so far as the public knows of the 'ground hogs' so called, who work in a little world of their own down under the harbor bottom.

"This work is also carried on continuously in three shifts during the 24 hours of the day. The estimated cost is 16 million dollars. The depth below mean low water of the harbor and the bottom of the tunnel will be about 85 feet, or about 50 feet below the harbor bottom. This traffic tunnel is being constructed under Chapter 297 of the Acts of 1929."

—C. BURTON COTTING, *Secretary*, 111 Devonshire Street, Boston, Mass.

1901

It is an experience, common to all mankind, that if a name or a person, of which or whom you have not heard for some time comes to your notice, within a few days other contacts with that individual will promptly develop. In dictating my last letter to you I noted the fact that our old friend Ralph Whitman had been promoted to his captaincy in the United States Navy. Hard upon my record of this fact comes to me, from Whitman, a clipping from the San Francisco *Chronicle* recounting the visit of Governor Lawrence Judd of Hawaii to San Francisco en route for Washington, and noted as the first member of the gubernatorial group is the person of one Lyman H. Bigelow who is Superintendent of Public Works of the Islands. Incidentally, in the body of the text it notes that the Governor was highly optimistic on the basis of the million-ton sugar crop, a bumper pineapple harvest, and a two-year record for tourists. Apparently it is open season for the visiting firemen all the year round, but it seems to me a trifle indelicate to announce it in just this way. I feel sure that the Governor and not Lyman is responsible for the infelicity.

Not content with one sending, Ralph shoots through a second from the same authoritative newspaper source. This second item deals with Greta Gray who, in the course of years, has acquired a doctorate, an associate professorship in home economics at the University of California at Los Angeles, and by assumption, at least, a wide circle of acquaintance among the embattled citizenry of Hollywood. As I remember Greta, she had very definite pictorial possibilities in our undergraduate days. The item goes on to add that Greta has been invited to contribute to the work of President Hoover's Conference on Home Building and Home Ownership. The home-wrecking possibilities of a Hollywood technique would seem to be the soundest approach to a subsequent feverish activity along constructive lines. Somehow it always makes me think of the story of the child in the Sunday school class who, on being asked by the fair young teacher what he must do to be forgiven, pondered for a moment

and then aptly and succinctly replied "Sin." There are possibilities in this program and I would call it to the attention of present friends and former playmates. Greta becomes an advisory member of the committee dealing with research on farm and village housing. As to the former, I have seen many times in Germany the happy union of flocks, herds, and droves under the same roof with the owner and his own offspring; but the village housing seems to me to open up vistas of possibility of communal life that strikes the effete East as a bit advanced. Still we have had Aimée with us for a matter of ten days recently but the laudable New England thrift counseling an emotional parsimony brought our corner on the 50-50 split to \$39.33 or thereabouts, which has not made any profound dent in the depression produced by the proposed closing of the Charlestown Navy Yard. I suppose really the soundest way to relieve destitution is to create a good solid hunk of destitution to be relieved. Anyhow, that seems to be the way it is likely to work out with us. The article terminates with the joyous news that Greta's enlistment under the Hoover standard was announced yesterday on the Berkeley Campus. I hope this catches Greta's eye and she sends me some of the more intimate details on the village housing.

Well, anyhow, I am profoundly grateful to Ralph for keeping me informed and I hope that he will never weary of well doing. There is no glut in the native-son market.

As a proper complement to Ralph's spicy little bulletins, in almost the same mail I get a communication from Freddy Freeman. Bill starts out with that fine flowing hand which has done so much to make him a famous cartoonist and, advising me in the most conventional and informative way, designates himself as President and General Manager of the New England Guild, Agent and General Manager of the Windham Manufacturing Company, and President of the Manufacturers Retail Service, Inc. Then as my eye wanders down the page I stop and gasp, for writ in letters clear to read I find "Latest additions to family, Brantwood Pat and Brantwood Mike." Now, of course, we've all recognized that touch of artistry in Bill which has lent a charming grace and whimsy to his presentation of even the most commonplace of matters, but this seemed to me an overtouch of more than Dickensian extravagance. You share in my relief when I tell you further that tucked away coyly in one corner of the sheet I found the glad intelligence that they are six-months-old Irish setters. I suppose these vicarious Hollywood contacts of mine got me all stirred up. Anyhow the country is safe again and I look forward hopefully to the day when I shall meet not only Brantwood Mike and Brantwood Pat but all the other little Brantwoods that bounteous nature lavishes upon our faithful dumb domestic friends. This is not a dirty dig at matrimony. Portland papers and the *Spur* please copy. Which, by an odd sort of indirection, makes me think of an

obituary that I once saw in the Dublin *Freeman's Journal Supplement* — how apposite in this connection the Freeman and the generic Mike and Pat — which ended "Saints pray for him, Mother Mary intercede for him. American papers please copy," suggesting, in its swelling crescendo, the last strophe of a well-known alma mater song of Teutonic background.

Having probably added to the magnificent total of my friends all that is wise and expedient, I hope you had a nice Thanksgiving though God knows what you have to be thankful for, and that we meet again soon at this safe distance. — ALLAN WINTER ROWE, *Secretary*, 4 Newbury Street, Boston, Mass.

1902

Charlie Tolman was at the Institute this month to see his son, Lee Prescott Tolman, who is a member of the freshman class. With Joseph Edward Philbrick in the junior class, this makes our delegation of sons at Technology equal to what it was last year when Belvin F. Williston was a member of the senior class. Probably young Williston is the first graduate of the Institute to have both his father and paternal grandfather among the alumni of the Technology, for he is named for his grandfather Belvin T. Williston '77 who was the father of our Bill Williston.

Harold Everett has been promoted to be head of the Department of Mechanical Engineering at Penn State College, where he has been professor for several years past. The Engineering School at Penn State and the department of which Everett is now head are comparable in size with the Institute and Course II respectively as they were in our student days. — Lou Cates took his vacation by going across and back in a Norwegian steamer. Lou has improved his opportunities to renew acquaintance with salt water, of which he was ever fond since he came east to New York. It must have been a real deprivation to Lou to have had to live so many years in Salt Lake City where the only salt water was altogether too salt! In more serious matters Lou, who is President of the Phelps-Dodge Company, has been appointed head of a committee of the American Mining Congress to consider steps for stabilization of the mining industry.

Abel Martin Hamblet died on June 7, after an illness of several months. The cause of his death was a cancer, which an operation last winter failed to cure. For several years before his death Hamblet was Director of Research for the H. W. Johns-Manville Company of Manville, N. J. Prior to his connection with this large concern they had been carrying on some scattered bits of research at their various plants and it was Hamblet's task to build up a central research laboratory to serve all the departments of the company and to train a staff to carry on extensive work in the various fields that this company handles.

Hamblet's first connection after graduation in '02 was with the Oxford Paper Company of Rumford, Maine, of which

1902 Continued

he had become assistant superintendent before in 1907 he left to associate himself with Jasper Whiting. During this time he was also interested in the development of lactic acid for use in various processes from bread making to shoe tanning. In 1921 Hamblet went to Akron on development work for the Goodyear Tire and Rubber Company and in his five years there he became manager of the research department. — FREDERICK H. HUNTER, *Secretary*, Box 11, West Roxbury, Mass. Burton G. Philbrick, *Assistant Secretary*, 246 Stuart Street, Boston, Mass.

1904

I sincerely trust that all my classmates have passed through a very Merry Christmas and earnestly hope that the general depression of long standing will soon disappear and that you all may enjoy a very happy and prosperous New Year.

Since the last issue of class notes the widespread depression has even made its influence felt in the items of class news which I have received, which accounts for the size of this month's contribution. A dispatch from Orono, Maine, dated October 15, made known the marriage of Emilie Lyon, daughter of Professor A. C. Lyon of the Civil Engineering Department of the University of Maine, to Howard F. McCracken of Brewer, Maine. The bride and groom are both members of the sophomore class at the University.

Reggie Wentworth returned about Thanksgiving time from a trip to Panama, and on December 1 assumed the position of Vice-President of Sharp and Doehme, manufacturers of drugs and druggists supplies in Philadelphia.

I am no Sherlock Holmes or have I any ability to discover the activities of my classmates from astronomical or other mysterious or scientific observations. I am entirely dependent for news items for *The Review* on the coöperation of other members of the Class, which in many instances seems to fail me completely, but I am always hopeful that a change for the better may take place. — HENRY W. STEVENS, *Secretary*, 12 Garrison Street, Chestnut Hill, Mass. Amasa M. Holcombe, *Assistant Secretary*, 3305 18th Street, N. W., Washington, D. C.

1905

This interesting letter is from Walter Bent. "Being tucked away in London I never see a 1905 man from one year to the other. I was in Boston last September with my wife and 20% of my children (e. g. the daughter). Stayed at the Parker House for several reasons. First of all, when I was a very small boy I used to lunch there with my father and in my eyes then, it was the world's greatest hotel, but most of all I wanted to be at the fountain head of Parker House Rolls, fresh broiled tripe and clams, not any of which I can get in England. And it seemed good to have a good old dark darkey waiter about at every meal. We had for dinner one evening young Payne, a second year Tech boy, son of my old friend Jimmy Payne, 1905.

"Boston seemed very good to me. I went in to look at Tech. I was tempted to drop in the office of Professor (Doc) Lewis but I remembered in time that he had never answered several of my letters to him so I thought, 'He must be an old crusty prof, probably as bald as I am and not a fit person to visit whilst on a holiday.' So I walked carefully past his door and told an old Harvard man who was with me that I used to know the Prof. I don't think this friend of mine believed me. . . .

"I am very busy. I have been promoted to take charge of the European Companies of the Eastman Kodak Company. I used to have charge of the factories (England, France, Germany, and Hungary) but now I have the sales, and so on, as well. So I find more than enough to do.

"My oldest boy is in America, he graduates at the University of Rochester this year. Three boys and one girl go to school in England."

Professor Frederick S. Woods represented The Institute at the Centennial celebration of Wesleyan University October 10 to 12. It was your Secretary's fortune to see quite a bit of him and indulge in considerable reminiscence. Mr. Woods is now the head of the mathematics department and chairman of the faculty. — Norman Lombard has moved his family to 31 Fairview Road, Scarsdale, N. Y. — Ralph Segar dropped in on October 5 and we had a grand, although short, chat. He is one of the very few classmates to stop here. He looked fine and said he had been doing electrical contracting all over New England. He has a daughter, six, who kept Mrs. Segar from attending our Twentieth, and a younger son. He is still in Westerly, R. I. — In the reorganization of the Phelps-Dodge officials as a result of the combination of this company with the Calumet and Arizona Mining Lloyd becomes chief clerk of the mining division of the combined companies.

Henry Buff sent us a clipping from the Boston *Herald* showing a photograph of the Aviation and Postal Facilities Committees of the Boston Chamber of Commerce on an inspection tour of the Boston Airport. And there was Frank Carhart. Upon inquiry Frank wrote: "I have been interested in aviation and have been on the Aviation Committee of the Boston Chamber of Commerce for over a year. This year I am Chairman of the Committee and we are using all the influence we can reasonably to get an adequate airport for Boston. This year the city is spending about \$600,000 mainly on the landing field and lighting which was initially planned to give us an A1A rating. Until quite recently this was the highest Department of Commerce rating that airports were given but they have now created a higher rating designated as an ATA rating or a transport airport. I think that with the money which is being spent we shall probably, however, get this latter rating for the Boston port."

Charlie Clapp says: "I believe I can announce the birth of a baby girl in August '30, which evens the family up,

making four boys and four girls; I have arrived at one distinction — that of having the largest family of any college president in the U. S. in so far as I know." — Elmer Wiggins was in town on November 7 with his wife and daughter for the Williams-Wesleyan game. He would not admit that he was scouting Williams. — George Jones' boy attended Amherst, Antioch and Northwestern. Now Margaret, our baseball player at Marion, has entered the University of Colorado at Boulder. George took her out and spent several days in Estes Park and Manitou. — Ros Davis represented Wesleyan University at the funeral of President Stratton in Trinity Church on October 21.

And here is the third and last part of Jack Flynn's travel story. "After Java, Sister and I spent a pleasant month with our admiring friends of Siam in their capital, Bangkok. You have, of course, seen a lot of pictures of Siam and its gleaming temples. They sure are gorgeously beautiful and I have some good photos. The Siamese are a most engaging race. I hope to go back when the price of rice gives them a reasonable return as they have some engineering projects of considerable importance to undertake. I met up in Bangkok with a Tech man who does the Institute proud. He's about '21 — Course I — Luang Bisal Sukhumvidya and is really what amounts to city engineer, 100% Siamese but also 100% M. I. T. En route to Saigon, in Cochin, China, where the French are hammering hell out of obstreperous communistic natives, I visited for a few days the ancient ruins of Angkor. Glorious and stupendous!

"Saigon is an absurd attempt to copy Paris. Very hot and uncomfortable — glad indeed were we to get to Hong Kong and bubbling over to arrive a few days later in Manila. Real honest-to-God food again, clean and safe — such a joy to get a T-bone steak in proper condition after refrigeration, and joy-of-joys — iceberg lettuce. In the Orient and generally everywhere except in our own dear land, one eats uncooked vegetables just before a violent spell of dysentery. I found a fine lot of fellows in the Army and Navy Club and a fine lot of old time liquor, too — real old 'bourbon' *par exemple* — but that means little or nothing to you folks at home who can get what you please from the bootlegger! I met up with a live-wire, hard-working bunch of Yankee business men operating the Atlantic, Gulf and Pacific Company and we tied up an agency arrangement so they can exploit our steel products in the Philippines. After Manila I had planned a return trip to Java (with a look-in at that 'Last Paradise,' Bali) then Malaya, Burma, and India but the sad news of the death of our President, Mr. C. T. Clark, in London, was relayed to me by radio while aboard the *President Hayes* so I finished up quickly my Oriental affairs and took the first fast boat out for Europe.

"I shall land again in Genoa but will go up to London by airplane probably from Marseilles as I'd like to fill my eyes with the beauty of the Riviera and the lovely Cote d'Azur.

1905 Continued

"When I arrive in London I'll know something of the future plans my people have for me. Now I've no idea what or where I am to be at! (Parse that and laugh a bit at my naïve diction — but after mixing my Irish-English with Spanish and dashes of German, French, Italian, Malay, Siamese, and Chinese it's a wonder that I can make myself understood at all.) Well here's the end of the page. Good luck to you and greetings to '05. May your days be long and sunny." — ROSWELL DAVIS, *Secretary*, Wesleyan University, Middletown, Conn. SIDNEY T. STRICKLAND, *Assistant Secretary*, 20 Newbury Street, Boston, Mass.

1906

The following letter has been received from Dennie. It is reproduced here as all will be interested. "The enclosed clipping from today's Portland paper will interest you, I know. One section was devoted to the American Legion Armistice Day Celebration, and sketches of Past Commanders of the Caldwell Post in Portland were scattered through it. Mrs. Denison and the children and I are staying here this winter. Have just finished our apple crop and will start cutting wood soon. It's a great life (during the depression!). Your account of the '06 Reunion in the November Review just received was very interesting and you must have had a great time. Would like to see Cy Young and his wife. They were always most cordial when I visited Minneapolis as Alumni Secretary."

The clipping referred to included a picture and several paragraphs concerning Dr. C. Eugene Fogg who is now a practicing physician at 35 Deering Street, Portland, Maine. Dr. Fogg was at the Institute only one year but will be remembered by many as he was captain of one of the companies in the Freshman Battalion. The following extract was taken from the clipping: "Dr. Fogg graduated from Portland High School, attended the Massachusetts Institute of Technology and graduated from Bowdoin Medical School. His first connection with the naval service was in 1909 when he became an executive officer in the old Maine Naval Militia, serving in this capacity until 1915. During the war he had a wide experience as a medical officer and surgeon at various stations. He was medical officer at the U. S. Naval Patrol Base at Portland, being on recruiting service. He also served as senior medical officer at the U. S. Naval Training Station at Hingham, Mass., and was also a surgeon on the U. S. S. *Sierra*. At the close of the war he was attached to the surgical staff of the U. S. Naval Hospital at Portsmouth, N. H. After being relieved from active duty, Dr. Fogg assumed practice in Portland and was assigned as surgeon of the 1st Naval District Brigade, U. S. Naval Reserve, holding this position from 1920 until 1928. In that year he organized and became commanding officer of the 312th Company, U. S. Marine Corps Reserve at Portland, being commissioned a captain in that branch of the service. This organization is the only one of its

kind in the State. Dr. Fogg is also active in many other organizations in Portland. He is a past exalted ruler of the Portland Lodge of Elks. He is a member of the Joint Faculty-Alumni Council of the Massachusetts Institute of Technology for Maine and is president of the Alumni Association of Western Maine. A graduate of the Bowdoin Medical School, he was an assistant professor of anatomy at that institution. He is a member of the Bowdoin Club of Portland."

The following from the Quincy (Mass.) *Evening News* of September 11, 1931: "William J. Lumbert, IV, has been appointed superintendent of the water works now being operated as a municipal plant. The selection was made by the three commissioners who were elected at a special town meeting. Lumbert was one of many candidates. He has had long experience in similar enterprises and has worked for the metropolitan commission in Saugus and Reading. He is a graduate of Dean Academy and Massachusetts Institute of Technology."

With further reference to Eleanor Manning's marriage, we take the liberty of reproducing an item from the October Review concerning Johnson O'Connor, who, notwithstanding what other fame he may achieve, will always be referred to in this column as Eleanor Manning's husband. This note was included under the heading Additions to Faculty: "Johnson O'Connor, as part-time Assistant Professor of Industrial Research in the Department of Business and Engineering Administration, graduate of Harvard University where he received his master's degree, and Fellow of the American Academy of Arts and Sciences. From 1913 to 1918 he was engaged in astronomical research with the late Percival Lowell, eminent astronomer, after which he did research work in metallography with the American Steel and Wire Company at Worcester. In 1920 he was on the electrical engineering staff of the General Electric Company, and later was put in charge of that concern's research in the psychological testing of aptitudes. At present he is engaged in an extensive research program of student testing in connection with Stevens Institute of Technology."

H. W. Brown called at the Secretary's office a few minutes on November 24. He is General Superintendent of the Battle Creek Plant of the Postum Company at Battle Creek, Michigan. He goes down to Detroit once in a while, and has a chance to see some of the '06 men in that city. He mentioned specifically Howard Blake, E. M. Elliott, Jack Norton and Stanley Udale. Blake is Construction Engineer with the Fisher Company who built the Fisher Building there. Elliott is Advertising and Assistant Sales Manager for the Wright-Austin Company, while Udale is with the Holley Carburetor Company. Jack Norton is Director of the Bureau of Laboratories for the city. Sylvester Wolfe is also in Detroit with the C. O. Barton Company.

We are indebted to Charlie Wetterer for a booklet describing inter-island radio telephone service for the Hawaiian Is-

lands. This was received from Bill Furer. By the time these notes are out it is expected that trans-Pacific radio communication will be possible between Hawaii and the United States, as at this writing the transmitting and receiving stations are now being completed and the final tests being made.

The Class will be interested to know that the Secretary has contributed \$25 from the Class treasury to Dr. Rowe towards athletics at the Institute. Dr. Rowe's acknowledgment follows: "Permit me to acknowledge the receipt of your letter of the 17th and the enclosed check from the Class of 1906. I greatly appreciate the generous contribution of the Class and equally your personal interest which has insured us this assistance. Frankly, there are needs each year for these contributions, but I am equally concerned with them as evidences of the approval of the alumni body of our athletic program as of the actual material assistance which they bring. With sincere appreciation for your interest and my formal thanks to the Class" — JAMES W. KIDDER, *Secretary*, Room 505, 261 Franklin Street, Boston, Mass. EDWARD B. ROWE, *Assistant Secretary*, 11 Cushing Road, Wellesley Hills, Mass.

1907

In the Boston *Traveler* of November 14 appeared a picture which certainly looked like the famous Mahatma of India, but the legend printed beneath read as follows: "This is not Mahatma Gandhi, though at first glance it appears to be. This Gandhi, otherwise Professor Henry B. Alvord, Head of the Department of Civil Engineering at Northeastern University, took first prize at a unique faculty costume party. He lives on Frost Avenue, Melrose."

Albert E. Wiggin, manager of the reduction departments of the Anaconda Copper Company at Great Falls, Mont., returned home October 1, after having been a patient for several weeks at the Mayo Hospital in Rochester, where he underwent a surgical operation. The last report was that he was making excellent progress toward recovery, and was expected to be back at his office desk very shortly.

Again Carl Trauerman's name appears in print in connection with his publicity work for the State of Montana. The Deer Lodge (Montana) *Post* prints the following: "Montana's first steel plant may go to Fergus county, due to a combination of circumstances, according to engineers who are in touch with plans of the investors on the east side of the Rockies."

"Plans to establish a steel plant at Lewistown are being pushed by residents of the Judith Basin metropolis, says Milton R. Wise, one of the promoters of the idea, who was in Butte recently to gather data and to complete certain arrangements necessary to the consummation of the project. Mr. Wise, one of the large property owners of Lewistown, makes his home in that city and also maintains business headquarters in New York."

1907 Continued

"While in Butte Mr. Wise consulted Carl J. Trauerman, President of the Montana Stock and Bond Company, regarding certain phases of the plan to establish the steel plant in eastern Montana. Mr. Trauerman is a graduate of Technology. He was reared in Pittsburgh, in the heart of the steel and iron industry, and on many occasions during his earlier years carried on research and mine examination for one of the largest subsidiaries for the United Steel Corporation. He has collected considerable material of interest to investors in a prospective Montana steel plant."

Harry Moody wrote me recently thus: "Have just finished reading my Technology Review for November and particularly the very successful Twenty-Fifth celebration pulled off by '06 — total registration, 81. Now, Nick, you know we can't let that '06 bunch put anything over on old '07. We've just got to make our Twenty-Fifth the biggest and best ever."

"Don't you think we ought to start talking, thinking, and acting about it? I know we've had a depression, but good times are coming and we've got to put over this Twenty-Fifth *big*. Haven't seen Ossie Starkweather since last spring, but I am sure you can count on the 'Siamese Twins' to make plenty of trouble at the reunion for we positively refuse to grow up."

So you men who read this, plan now on three June days — probably the 17th, 18th and 19th — to join your classmates in one grand good time. Remember your suggestions are welcome. — BRYANT NICHOLS, *Secretary*, 19 Rowe Street, Auburndale, Mass. HAROLD S. WONSON, *Assistant Secretary*, Commonwealth Shoe and Leather Company, Whitman, Mass.

1908

The first bi-monthly dinner of the 1931-32 season was held on November 17 and was very well attended. The following were present: Towle, Booth, Heath, Gurney, Newhall, Wells, Davis, Cook, Skillings, Appleton, Gerrish, Collins, Mayo, Merrill, Carey, and Carter.

Your Secretary was in Cincinnati a month or so ago, and had opportunity to look up some of the boys and talk over our coming Twenty-Fifth Reunion. Saw Luther, Sando, Spiehler, Stewart, and Willey. At Dayton, saw Kiefaber. Putnam was in the east, so I was unable to see him. Also had a chance to visit a little while with Hayes at Buffalo, and talked with Barton at Albany over the 'phone.

Had a pleasant call the other day from Jimmy Burch who had come on east to bid his family "bon voyage" as his wife and daughter are to spend the winter in Switzerland, where his daughter is to be in school. — HAROLD L. CARTER, *Secretary*, 185 Franklin Street, Boston, Mass.

1911

With deep regret we learned from Walter Welch, VI, recently of the death of Jack Devlin, III, at his home, 11 Crescent Road, Larchmont Gardens, New York, on Saturday, October tenth, after an illness of several months. He was

buried from Holy Trinity Church, Mamaroneck, New York and is survived by his wife and two children. Walter said he used to see Jack quite often, both being commuters on the New Haven, and the latter regretted that illness in his family prevented his Reunion attendance. For several years preceding his death Jack had been assistant to the president of Manning, Maxwell and Moore, Inc., in New York City.

It was also a great shock to learn of the sudden death of Ced Anderson, VI, as reported in the New York *Herald Tribune* of November 14: "Cedric Anderson, 42 years old, of 21 Pinecrest Drive, Hastings-on-Hudson, died of a heart attack yesterday while listening to a lecture in the School of Business at Columbia University. Dr. William H. McCastline, Director of Medical Service at the university, attended him. Apparently in good health when he left his wife and four children at Hastings, Anderson had driven to the city and reported to his class in advertising under Professor Howard K. Nixon soon after nine o'clock. A few minutes later he collapsed and died without regaining consciousness. Professor Nixon dismissed the class at once, and while Mr. Anderson was being taken to the funeral parlors, university officials notified his wife. She said later that her husband had no record of any heart ailment. Mr. Anderson, who was graduated from Technology, had been a practicing engineer, but gave up his work this fall to take a full course in the School of Business to qualify himself for an executive position in the engineering field."

Among the Honorary Secretaries recently appointed throughout the country by President Compton "to act as academic ambassadors in their communities for the Institute" we are proud to note George Forristall, II, Houston, Texas, President of The Technology Club of Southern Texas. It is also pleasing to note that we have five other classmates, who are presidents of local alumni associations, *viz.*: Harry Alexander, II, The M. I. T. Club of Akron; Don Southgate, IV, The M. I. T. Alumni Association of Nashville; Dick Ranger, VIII, The Technology Club of New York; Herb Angell, IV, Portland, Oregon, The Technology Club of Oregon; and O. H. Shenstone, I, Toronto, Ontario, Canada, The Technology Club of Lower Ontario. Lloyd Cooley, X, at Chicago and Bill Pead, VI, at Montreal, are secretaries of local associations and are '11 men.

Don Bakewell, II, formerly President of the Duquesne Steel Foundry, Coraopolis, Pa., is now Vice-President of the Continental Roll and Steel Foundry Company, with offices in the Grant Building, Pittsburgh. — A. T. Cushing, I, senior valuation engineer, U. S. Department of Agriculture, Kansas City, Mo., writes that he recently spent a month in Sioux City, Iowa, collecting data for appraisal and report on a sizable stockyard there, and on his return he was delighted to be recognized by his "M. I. T. '53 man, whose arrival was reported about nine months ago."

Marc Grossman, III, has transferred from Central Alloy Steel Company, Canton, Ohio, to the Illinois Steel Company, South Chicago, Ill. — Norm Lougee, VI, for years with Stone & Webster in Boston, has been transferred to the Metropolitan district and is now residing at 27 Homesdale Road, Bronxville, New York, thus leaving the Witch City (Salem), where he has resided since birth.

In a recent issue of The Boston *Record*, The Wisdom Box, conducted by George C. MacKinnon, contained the following anent Charlie Linehan, I, who still teaches and coaches at Rindge Tech in Cambridge: "The caddies at Charles River Country Club fight to caddy for Charlie Linehan, and it's not, as you were so darned sure, becuz he tips 'em more'n anyone else . . . It's becuz he mixes flights of wit with flights of golf ball . . . our spy system working on Charlie by the way."

Dick Tolman, XIV, professor of psychology at the California Institute of Technology, took an active part in the mid-November meeting of the National Academy of Sciences at Yale University. Let Howard W. Blakeslee, Associated Press Science Editor, tell the story:

"New mathematics, indicating that the universe may possibly go on living forever, was presented to the National Academy of Sciences at Yale University today (November 18). The scientific idea for years has been that inevitably creation is bound some day to freeze up, a form of universal death, not only for earthly life, but for all forms of energy.

"The new mathematics was explained by Dr. Richard Chace Tolman of California Institute of Technology. He ranks as one of the best known mathematicians in the world, and is one of the men with whom Einstein conferred on his visit to the United States a year ago.

"The old 'heat death' theory is based on the fact that matter is rapidly being converted into heat, light, and the other forms of radiation, and the thermodynamic laws which seem to prevent a reversal of this running down hill process.

"Dr. Tolman has created some mathematical 'models' of creation in which this seemingly impossible reversal takes place. He said these models are not real universes, but are partly analogous to actual facts, each one different from present known realities in some significant respect. So very little is known about the universe outside the immediate neighborhood of the earth that these mathematical models are not necessarily improbable dreams.

"If radiation, that is light and heat, start converting themselves back into solid matter, the universe which now is running down can some day again renew its youth. In one model Dr. Tolman finds this mathematically possible, provided matter changes into radiation fast enough to maintain a certain necessary equilibrium or balance.

"Other models which show possibilities of rebuilding an aging universe are produced by applying the principles of relativity to thermodynamics.

1911 Continued

"Under the new thermodynamic principles thus created, the old law of conservation of energy, which seems to require that the universe shall ultimately freeze up, works differently.

"The result, said Dr. Tolman, is a picture of future conditions 'which could lead to less terrifying results than in classical thermodynamics.'"

An interesting announcement in closing: Emmons Whitcomb, X, has recently opened his own office at 551 Fifth Avenue, New York and here is his announcement:

"When I. A. Whitcomb with Walter Raymond founded Raymond & Whitcomb, he was a pioneer in the travel business and became a trusted advisor to countless clients and friends. Now his son, E. J. Whitcomb, has resigned from the Raymond & Whitcomb Company and announces the organization of a new Company to carry on the policies of his father and furnish a travel service to meet present day needs."

Your classmates wish you all kinds of success, Emmons, as president of E. J. Whitcomb Company, Inc.

Your scribe and his co-partner hopes that every classmate and his family had a very Merry Christmas and will have a particularly happy and prosperous New Year. — ORVILLE B. DENISON, *Secretary*, Douglas Inn, Douglas Hill, Maine. JOHN A. HERLIHY, *Assistant Secretary*, 588 Riverside Avenue, Medford, Mass.

1912

E. C. Holbrook, I, sailed from Seattle, November 14 en route to Manila, P. I., where he is to be resident engineer for the Pacific Commercial Company. This company has the agency for the Truscon Steel Company with which Holbrook has been connected for many years.

C. L. Dows, VI, has just been heard from through H. B. Richmond '14. Richmond has the following to say about his pleasant visit: "I spent one of the most delightful days that I have spent for a long while with Dows at Nela Park. The work they are doing there is tremendously interesting, and Dows occupies a most important position in the organization, being in charge of tests and standards in the engineering section. From the number of times his telephone rang during the day and from the number of people that stopped him when going through the plant, it certainly seemed evident that the solution of many important problems rested on his shoulders.

"Quite aside from his official activities, I learned that he has been active in many outside affairs, being a past chairman of the Cleveland sections of the American Institute of Electrical Engineers, and also of the Illuminating Engineering Society. At the present time he is devoting considerable time to his duties as Treasurer of the First Baptist Church, which has recently completed a million dollar structure. He also finds time to be a good Mason and to bring up a couple of very alert looking youngsters."

John Noyes, II, expected to be in Boston and New York on an eastern trip, but has not yet appeared. Anyone being in

Chicago is instructed to call Whitehall 7788, the Sullivan Machinery Company office in the Wrigley Building, to find out whether or not John is in the city. — FREDERICK J. SHEPARD, JR., *Secretary*, 125 Walnut Street, Watertown, Mass. DAVID J. McGRATH, *Assistant Secretary*, McGraw-Hill Publishing Company, Inc., 330 West 42nd St., New York, N. Y.

1913

Our only contribution for this month is about Larry Hoyt. Until recently we had assumed that he was still at Evansville College (Indiana) as director of engineering. The following item is from an October issue of the Greenville (S. C.) *Piedmont*, and explains itself. "Laurence B. Hoyt, a representative of Meade Johnson Company, of Evansville, Ind., a large food concern, announced today the company would build a soup factory near Columbia to use South Carolina 'iodine' vegetables in preparing its products.

"Mr. Hoyt said Lambert Johnson, executive manager, would come to Columbia within two weeks to arrange for the building of the plant. Several sites are being considered for the plant, Mr. Hoyt said. He explained that the company was attracted to South Carolina through the State Natural Resources Commission, of which Dr. William Weston is managing director. Mr. Hoyt, a graduate of Technology, said he would move his family to Columbia and would be in charge of the local factory." — GEORGE P. CAPEN, *Secretary*, 50 Beaumont Street, Canton, Mass. ARTHUR L. TOWNSEND, *Assistant Secretary*, Room 3-435, M. I. T., Cambridge, Mass.

1914

With but a few Civil Service positions open and with many thousands of applicants for such positions, it is with unusual pleasure that we find that the successful applicant for one of these positions is a '14 man. All of which is by way of announcing that Frank Ahern has been appointed Fire Protection Engineer with the Department of Commerce, at the Bureau of Standards, in Washington. In view of the fact that this is an important position, with applicants from all over the country, we certainly extend congratulations to Ahern on being the successful appointee. The position involves administrative supervision, formulation of fire protection and prevention standards, testing and research work on fire resistive materials and methods of construction, and plans and methods for the use of fire protection equipment. It looks as if Frank would have a busy time.

Another man who has been actively engaged in Washington, particularly during the past year, is A. H. Hanson. Al writes: "The past year has been my busiest 'up to now' as Andrew H. Brown would say. We have been equipping and moving into a new eight-story addition to the Government Printing Office which has required quite an addition to my regular force, which now numbers about 400." Hanson is Superintendent of

Buildings at the Government Printing Office. He also apologizes for being rather late in announcing the arrival of a third daughter, Elaine, born December 6, 1930. It is easy to see that he was a Course VI graduate and was strong for triple E, as he has named his daughters Eleanor, Evelyn, and Elaine.

Pat Adams manages to get his name in the paper with the usual frequency in spite of his extended summer at Thetford, Vt. A short while ago the Boston *Post* carried this heading: "Fiery Blast at Navy Accuser — Porter Adams Flays Rep. Wood in Wire." The article that followed described Adams' condemnation of the attack on the Navy.

The November *Reader's Digest* carried an article entitled "Scents That Make Dollars." A major part of this article dealt with the work of Ernest Crocker. As near as your Secretary can make out the writer of the article was trying to justify the classification between perfumes, scents, and just plain odors. In quoting Crocker, the author wrote in part as follows:

"This eager young chemist and I got to talking at some length about this odd business of odors. Among other things, he said that whereas men are more often color-blind than women, women are more often insensitive to odors than men. Men like spicy odors, women don't — perhaps because spice reminds them of the kitchen, which they want to get away from. Women are very sensitive to burnt odors; men aren't. Women like the odor of musk, even when it is quite rank; men don't.

"Crocker, along with his co-worker, L. F. Henderson, is more influenced by odor than by sight, and he can remember smells better than things he has seen. He can follow the trail of a fox for a considerable distance, he told me. . . .

"Crocker and Henderson have tentatively divided all odors into four elementary odor sensations: fragrant, acid or sour, burnt, and caprylic, which means goatlike. Most odors contain all four elements in varying proportions, and the one or two that predominate determine the final character of the odor. They have even attempted to indicate mathematically the proportion of each of the four elements in a large number of odors, which they do by smelling for each element, one at a time, and assigning it a number in accordance with its strength. They say that even a dub at smells can be taught this trick."

For a number of years, under the very successful leadership of Allan Winter Rowe, the athletic policy of Technology has been improved. A very large number of teams now engage in a vast variety of sports. While these teams are not essentially varsity teams, they do give a very large proportion of the student body an excellent chance to engage in athletics. In addition to these intramural teams, there have been some most successful varsity competitions. Naturally, with a limited number of varsity teams, the revenue is very small. This deficit has been made up by the Alumni. Our class

1914 Continued

on a few years contributed. Each class has been asked to contribute \$50. Will you please aid in our contribution this year by sending your check for this purpose direct to your Secretary? Contributions from one to five dollars will be gratefully received and most effectively used under the efficient direction of Dr. Rowe. — HAROLD B. RICHMOND, *Secretary*, 30 Swan Road, Winchester, Mass. GEORGE K. PERLEY, *Assistant Secretary*, 21 Vista Way, Port Washington, N. Y.

1915

Forget 1931 as you would a bad dream and accept my heartiest wishes for a successful, enjoyable, and prosperous 1932. What better New Year's greeting than the story of our Class Dinner at the University Club, Boston, on November 10. Around the table to enjoy the hearty dinner were: Ernest Hayward, IV, George Moulton, II, Roland Baldrey, IV, Horatio Lamson, VIII, George Rooney, I, Weare Howlett, X, Jac Sindler, X, Ralph Joslyn, X, John N. Dalton, X, Frank Scully, I, Larry Launders, X, Herb Swift, II, Abe Hamburg, XI, Max Woythaler, V, Chet Runels, IV, Reg Foster, X, Frank Foster, I, Henry Sheils, I, Louie Young, II, Les Heath, V, Clive Lacy, V, Frank Parsons, II, and your Secretary. This attendance of 23 equals our record of last year and would have established a new mark had some of the fellows who regularly attend been able to be there.

You can easily guess the good time we had. It's been a long time since we've seen Ernie Hayward and George Moulton and they were very welcome. The principal business was planning for our next reunions. Frank Scully has been appointed chairman of a committee to consider arrangements for our Twenty-Fifth Reunion. Think of it! Men in '16 and '17 have approached us to hold a joint Twentieth Reunion. This sounds good but I would like to know how you all feel about it. The men at the dinner suggested that the secretaries meet to discuss this. So soon you should be hearing from Frank or me on the plans. After dinner 12 of us bowled as two six-men teams and what noisy and gay competition that was!

We had hoped to have Alton Cook, V, at the dinner to welcome his recent return to Boston. The following letter from him is explanation enough. Soon we shall know the result of the blessed event. "Although I had hoped to attend the first dinner of the Class since my return to Massachusetts, it seems that circumstances have willed it otherwise. Due to an impending addition to the family in the immediate future, I am unable to make any definite plans at the moment.

"The enclosed check, therefore, is not for the dinner, but for the long overdue class dues. Here's hoping that you have a fine crowd and a fine time on November 10. Best regards to all."

Louie Young has resigned as an instructor at the Institute and with Professors Barss and Knobel of the

Physics Department, has formed Barss, Knobel and Young, Inc., consulting physicists, with offices in the Kendall Square Building, Cambridge. Congratulations and success to you, Louie, from us all.

Louie Zepfler, V, was recently in Boston. He, Louie Young, and I had lunch together. We had a pleasant and enjoyable visit reminiscing over our old experiences, discussing our positions and business, and their families, in which respect they are one up on the bachelor secretary. — Johnnie O'Brien is a general contractor at 3 Endicott Street, Boston. He would like to hear from some of the boys around Boston.

I hope to be able to report a New York dinner next month. At any rate there will be more of the enjoyable letters that came with the dues. — AZEL W. MACK, *Secretary*, 379 Marlboro Street, Boston, Mass.

1917

At every opportunity we shall mention that '17 has a Congressman — one Lewis W. Douglas. It is reported that recently he has been giving considerable time to gathering facts and arguments for a tariff on copper at the coming session of Congress. This work was done in Washington but a last report from Professor Locke is that Douglas is back in Arizona.

We received word that Ras Senter had changed his address so we wrote him to ask why. As might be expected he does not slight his task in replying: "Your note of the 3rd just received and as a matter of fact there has been no change of address as I have been in this location for about a year, having failed to notify you. I am still in the oil production business except that we have been almost inactive for some time. Simply sitting in the boat and holding on — pumping a little production to hold leases and hoping for a turn for the better. As a friend of mine remarked the other day, he was reminded of the time when he used to go swimming and see who could stay under water and hold his breath the longest. However, crude oil advances within the last few days and an upward trend in gasoline prices today indicates better times for our industry. The East Texas field, which has almost ruined West Texas and other producers is rapidly being defined and drilled and with proration an assured fact, under military law and in defiance of Federal injunctions, I believe that we can expect more normal conditions. While the depression has been more world wide than before and nearly every industry hard hit, I feel sure that this country will weather the storm. With our enormous resources, purchasing power, manufacturing capacity, and shall I say business brains, we certainly ought to be able to adjust business for this country at least. Loss of world markets has upset the whole scheme of production but sufficient time has now elapsed for an adjustment all down the line. Surely with all the business brains available in this country some plan can be evolved whereby we can all do a little business — on a much reduced schedule — but at least keep going."

And now for the big news! Mr. Robert Curtis Erb is no longer master of his own destinies. He was married on Wednesday, November 11, at Lowell, Mass., to Miss Lillian Louise Chaloux. On their return from their honeymoon, Mr. and Mrs. Erb will live in Nashua, N. H., where Bob spends a large part of his time managing production activities of the J. F. McElwain Company, producers of shoes, perhaps better recognized by those not in close touch with the shoe and leather fraternity as associated with the Thom McAn store organization. Bob's factories have been known in the shoe trade as among the most modern and progressive and they are frequently visited by delegations desirous of keeping up to date in the game.

I hope that Mrs. Erb will not read these notes as I take this means of suggesting to Bob that he now make arrangements for the reunion at the Corinthian Yacht Club next June. By that time he is apt to find out who is manager in the family and make business reasons why he can not attend, unless he has previously committed himself. This hint may serve to remind others. — RAYMOND STEVENS, *Secretary*, 30 Charles River Road, Cambridge, Mass.

1918

Unhappily these notes will be too late for that Christmas card list, but Bob Van Kirk has moved to 314 Creston Avenue, Kalamazoo, Mich. This perhaps explains why our best can-opener, crow-bar combination has failed to get a letter out of him. Bill Foster's house, built to help relieve the depression, must be complete, for his address is now 25 Kensington Road, Scarsdale, N. Y. — Wendell P. Monroe knows his acorns all right. When he left Oak Park, Ill., he came to anchor at 620 West Oak Street, Oakland City, Ind. We call that making two grow where only one grew before. — James L. Clark has had enough of New England winters. New Hampshire has lost him to Box 546, Ortega, Fla. Bill Fisher, X, salesman *par excellence*, has gone from Akron to 1513 Builders Exchange Building, Cleveland.

On November 9, the New York contingent had a dinner in Greenwich Village. Details forbidden by Boston Watch and Ward Society. — November 15 Gretchen played Pete Sanger a round of golf and almost froze a little finger.

The Milton paper for November 14 reports the marriage on that date of Madeline A. Duffy, daughter of the town Treasurer, to Professor Harold C. Wilbur. Professor Bill Ryan was the best man. A good professorial time was had by all, particularly since the ceremony culminated a romance which started in grammar school and which has been serious for at least 16 years.

Samuel Fuller is not among those who go down to the pasture and wait for the cow to back up to be milked. He is going after the cow, his particular brand of bovine being the construction business. After a 12-year apprenticeship with the Turner Construction Company of Boston,

1918 Continued

Fuller and an associate have organized to specialize in factory and general building alterations as well as new construction. Start the new year right by calling them in as experts. — F. ALEXANDER MAGOUN, Secretary, Room 1-305, M. I. T., Cambridge, Mass. GRETCHEN PALMER, Assistant Secretary, The Thompson School, Wilson Road, Rowayton, Conn.

1920

Your secretary is pleased to report several important pieces of news this month. First of all, the Class's two outstanding matrimonial holdouts have finally succumbed. Mr. Kenneth Fellows Akers was married October 31 to Mary Joan Reed at Weston, Mass. The entire Class congratulates you, Ken.

Jack Coyle likewise contributes to the startling news in the announcement of his engagement to Miss Nancy Doyle of Montclair, N. J. This is great news, Jack.

I am also pleased to report three birth announcements: that of Jeanie Clark, second child of Mr. and Mrs. Myron H. Clark of West Hartford, Conn., born on October 9; that of Albert Keith Tirrell, son of Mr. and Mrs. Robert W. Tirrell, born on November 4; and that of Francis Lawrence Federhen, son of Mr. and Mrs. Herbert M. Federhen, 3d, born on November 24. Congratulations to all of the proud parents from the Class.

I was pleased to get an interesting letter from good old Chuck Reed from his home in Lakewood, Ohio. Chuck says he sees a good many Technology men from other classes but few from 1920. He did see Monroe Shakespeare who still resides in Kalamazoo. Chuck says he has also heard from Ev Freeman occasionally, and had a visit with Dolly Gray in New York some time ago. Chuck is the proud father of two sons, one seven years old and the other born September 30, 1931.

All of the above news was contributed directly by the classmates referred to and represents the best showing in the way of direct contributions your secretary can remember. He is duly grateful and hopes others will profit by the above example.

G. I. Brown has moved from Cincinnati to Baltimore. Frank Bradley is still around these parts, residing at 11 Winthrop Street, Everett, Mass. Ted Bossert is now in Maryville, Tenn. Livingston Wright has left Marshfield, Mass., and is now in Washington, D. C. Larry Weinert has left Albany and is in Millbrook, Dutchess County, N. Y. Dan Whelan is now Professor Daniel Whelan of Loyola University, Chicago, Ill. Ray Ridgeway is living at Niagara Falls, N. Y.

I was glad to receive indirect word of my good old friend, Ki Chun. Ki is with the Commercial Finance Company, Ltd., at Shanghai. — HAROLD BUGBEE, Secretary, 7 Dartmouth Street, Winchester, Mass.

1921

In connection with the \$50 which the Class has contributed to the Alumni Athletic Fund, we wish to acknowledge

a letter from Dr. Allan Winter Rowe expressing his sincere appreciation and thanks for our support.

"Mr. Charles E. Whitley announces the marriage of his daughter, Elizabeth Gertrude, to Mr. Roy Brooks Chase on November the first at Newburyport, Mass." Roy is with the motor vehicle department of the Commonwealth of Massachusetts and is located at Commonwealth Pier, Boston. He and his bride are making their home at 298 High Street, Newburyport.

We broadcast the following through the kind permission of the copyright owner, Professor C. E. Locke: "Ernest R. Gordon writes that after leaving the American Smelting and Refining Company in Mexico he became associated with the Amparo Mining Company, subsequently spending about a year and a half as Superintendent at their Piedra Bola mine. About two months ago he was transferred to Guanajuato to take charge of the San Nicolas del Monte mine. He says that this exploration work is proceeding satisfactorily, including unwatering, and if results continue to be favorable, a mill will be necessary within the next few months."

Ran into P. T. Coffin walking up Bethune Street after having visited the Bell Laboratories on some errand calculated to instill and fan into realization an ever-increasing clamor for bigger and better aluminum. Pip is with the Aluminum Company of America, 230 Park Avenue, New York, and if he isn't telling about the superiority of their products, it is because he has taken time out to launch a justifiable dissertation on those three fine youngsters of his out at 30 Madison Street, Glen Ridge, N. J.

Another member of the Class has published a book. This time it is David O. Woodbury, who is author of "Communication," published on October 30 by Dodd, Mead & Co., as the first of a series to be known as "Man's Achievements." The present book is a full-length volume containing a popular account of the subject, including everything from sign language to spirit communication, discussing on the way the usual forms such as telephone, telegraph, radio, etc. The New York Times has given the work a very favorable review, complimenting the author on the careful and extensive research which has gone into the making of the book and recommending it to the general reader and also for supplementary school reading.

After hearing about this work, we wrote an impassioned letter to this new 1921 celebrity, appealing for news for these columns and deftly suggesting that we are looking forward to reading the book. We have received a lengthy letter from 5 Thompson Ave., Hingham Center, Mass., addressed to us care of "The Wilds of New Jersey," in which Dave says: "Since my business seems to be writing, the hardship of supplying information for Class consumption is a minimum for me. As for myself, I fear I have not been a credit to Course VI, or 1921, or the Institute in general. Professor Bush,

long ago, told me I ought to design automobile bodies, as this combined a degree of engineering knowledge within my reach, together with artistic sense which he kindly inferred that I possessed. In its spirit the remark was extraordinarily close to the truth. I bounced around the industries of the country until I found just that combination of light engineering and art (?) in which I am now disclosed as yet as an unsuccessful, but a hopeful, participant.

"While the rest of you go marching on, to the everlasting glory of Technology and the engineering profession, I am like the waiter after a banquet: I pick up the bones that you have gnawed and thrown under the table; I carefully lift the torn and grease-stained table cloth and bear it away; I take the shoes and top-hats down off the chandeliers and erase the names from the walls, which you have written there in your zeal in cranberry sauce and Russian dressing. In short, I clean up after you and try to tell your story to an indifferent yet potentially enthusiastic world.

"It is my pastime to destroy the publications for which I write. I began by sinking *Motor Boat*, one of the oldest in the field. I next turned my attention to *Sr. Nicholas*, and for some time that craft kept up its proud record. But not for long, and now the magazine is published only for tots of three or so. Then came the *Encyclopaedia Britannica*, a truly noble work. Into the Fourteenth Edition they injected an article of mine — but why go on? The *Youth's Companion*, which had lived more than a hundred years, tottered at my first blow. I put in a few successfully destructive months with the religious juveniles and cleaned up I know not how many of them. Then I turned my attention to the publishers. Evidently they had not been forewarned. I have one of them where I want him already, and I only hope that in the crash soon to come, innocent parties such as the telephone, telegraph, and radio industries will not be impaired as well. I am only a beginner in the book field so my efforts may not at once be successful.

"I have a design against another publisher in the shape of a second so-called engineering book. Whether it will finish him I cannot tell. It will certainly cripple him, anyway; I have the depression on my side and it ought to help considerably.

"I have turned my attention to other fields now. I am after the authors themselves. I have written a novel in the combined manner of Theodore Dreiser, Ernest Hemingway, and Vina Delmar. I cannot hope to ruin this mighty triumvirate (not quite accurate as to sex, but you know what I mean) all at one blow, but I'll get one or two of them, anyway. This novel should show several things: first, that engineers are not devoid of human impulses in spite of the difficulty of keeping members of the scientific societies awake when their papers are read; second, that an engineering training is perhaps the best start a man can hope to have for being a barber, a dentist, or a literary man; and third, that Dr. Bush

1921 Continued

was wrong. For my own sake this thing will be published anonymously, and if the publishers keep the secret, you will never know what hit you or who fired the shot. But I shall, and I shall gloat away off here among the elms and the commuters, and let the world bury its illustrious dead as it sees fit."

Our sincerest holiday greetings and best wishes to all of the Class for the New Year. — **RAYMOND A. ST. LAURENT**, Secretary, Rogers Paper Manufacturing Co., South Manchester, Conn. **CAROLE A. CLARKE**, Assistant Secretary, Bell Telephone Laboratories, Inc., 463 West Street, New York, N. Y.

1922

Apparently no plea nor even the absence of news will stir members of the Class to a point where they will send information regarding themselves and those whom they see to the Secretary. Such being the case, it will be necessary to depend upon the few personal contacts that I am able to make and clippings from the newspapers for class news.

Chuck Brokaw is an investment counsel in Detroit. Apparently he has recognized the need for someone who is schooled in the fundamentals of sound investment. This may be the time for us to see Chuck to set up a good surplus in the next few years. — **Fred Dillon** has been elected Vice-President of the Worcester County Alumni Association. The group in Worcester County is very active, maintaining a scholarship program, and they recently voted to send another Worcester County graduate to the Institute for a year.

Early in September **Francis Spalding** was married to Miss **Margarethe Geisler** in Cincinnati. They will live at 384 Probasco Avenue in that city. — **Don Carpenter** in Leominster with the du Pont Viscoloid Company, has become an authority on the rejuvenation of apple trees, rose bushes, and grapevines. He says that he is in New York frequently, but although I have tried to reach him for six months, it has not been possible.

Wes Manville has been promoted from assistant manager of the Technical Products Department of Shell to manager, replacing **Paul Ryan** who was recently appointed Advertising and Sales Promotion Manager. — **Bill Elmer's** engagement was announced recently to Miss **Hersilia Warren**. Miss Warren was graduated from Kendall Hall School at Prides Crossing. Bill is with the Edison Company in Boston. They plan to be married early in the spring.

George Nesbitt in Menlo Park, Calif., combines the real estate business with the operation of gasoline stations. **Julian McFarland** shares the risks, and we hope profits, with George. — **Harold Clements**, who is chief engineer at the du Pont plant in Newburgh, was married early in October to Miss **Barbara Higginson** at Tarrytown, N. Y. They plan to live at Cornwall, N. Y.

Bill Roberson was married on October 3 to Miss **Mary Paxton Chamberlain** at Grace Church, in New York. — **Ham**

Beattie was married early in the summer to Miss **Neoline Wiggmore**. **Ham**, who is associated with his father, a marine contractor, is living in Tiverton. — **John Poole** was married early in the summer to Miss **Belle Dale**. They plan to live in Waltham, Mass.

George Potter has been elected Vice-President of **Hewes and Potter**, the company that has been so successful in establishing the "Spur" tie. George wisely found experience with a number of prominent companies, and for the past five years has been associated with this very successful business. — **Bob Purinton** is in Augusta. He says that he manages to keep an old nag exercised, plays tennis, or skis as the season allows, leading, it would seem, a healthy and very natural life.

Perhaps you will include in your New Year's resolutions one to write a few facts about yourself to be included in an early spring issue of *The Review*. If you make such resolution, act quickly before the spirit dies. All good wishes for a happy and successful year in 1932. — **RAYMOND C. RUNDLETT**, Secretary, The Curtis Publishing Company, Lincoln Building, 42nd Street, New York, N. Y.

1923

I hope the one item contributed this month by **Al Pyle**, Secretary of Course VI, does not represent a last flicker of life from our practically defunct organization of Course Secretaries. This once thriving organization has long been comatose. Al crashes through with confirmation of the wedding of **Tom Rounds** about which forthcoming event we've heard several rumors recently. **George Bricker** was best man and Al was an usher so we may consider this information reliable. The couple will make their home in Stamford, Conn. For the benefit of those who did not read the notes last month Tom is with the **Norma-Hoffman Company** of Stamford, makers of roller bearings.

R. H. Park, VI, was with the **General Electric Company** at Schenectady last year but left them to join **Stone and Webster Engineering Corporation** in Boston. He is living at **Pembroke**, Mass.

Bill Godbout, X-A, when I asked him about a recent change of address, reported as follows: "Last December we migrated from **Bristol, Conn.**, to 752 East 27th Street, **Paterson, N. J.**, because **Godbout, père**, had got him a new job in these parts with the **Joseph Dixon Crucible Company** in **Jersey City** (manufacturers of graphite products for over one hundred years, makers of **Eldorado**, the master drawing pencil, adv.). In September we moved from the 27th Street address to 741 20th Avenue, all of **Paterson**, for the mighty good reason that the former landlord gave me a pain in the neck, and mostly because we (I say we because there is **Mrs. G**, **Bob**, **Sis**, and **Buzz**) found a place that was almost just what we wanted. With a squad like that it is almost a necessity to have a single house, seven rooms, and a yard like a recreation park. And in the bargain father **William**

got him a basement where he can set up his workshop and build model boats to his heart's content (in spite of, and notwithstanding, naval disarmament to the contrary). And that, dear sir, is the story behind the **Godbout migration**."

I have a card from **Dr. William Albert Gallup**, V, formerly a member of the research staff of **Arthur D. Little, Inc.**, announcing the opening of his own office at Room 625 Chamber of Commerce Building, Boston. The card announces that his services are available to individuals, trustees, and bankers for rendering reports and advice regarding investment values, particularly those situations involving chemical products or processes. It announces further that he will also undertake for private investors the supervision of their holdings of securities as well as the analysis of their specific investment problems.

Great as the loss was to all the world in the death of **Thomas A. Edison**, it was inconceivably greater to **Theodore M. Edison VIII** who thereby lost a parent. By the inventor's will, **Theodore** and his brother, **Charles (M. I. T. 1913)**, are his principal legatees and executors.

Clippings from **Yonkers' newspapers** tell of the marriage of **A. A. Buhler**, XV, to Miss **Louise T. Wolf** at St. John's Lutheran Church of that city in October. The couple honeymooned in Bermuda, returning to reside at 1630 Undercliffe Avenue, **Yonkers**. **Buhler** is with the Plant Department of the **New York Telephone Company**.

Among address changes which appear to have some special significance are the following: **Dr. William P. Allis**, VIII, from **Cambridge, England**, to **Cambridge, Mass.**; **Cecil H. Green**, VI-A, from **Dallas, Texas**, to **Newark, N. J.**; **Robert H. Kean**, X-A, from **Chicago**, to **Washington, D. C.**; **John C. Todd**, IV, from **Cincinnati, Ohio**, to **Evanston, Ill.**; and **Major H. H. Zornig** from **Berlin, Germany**, to **Washington, D. C.** — **HORATIO L. BOND**, Secretary, 31 Concord Avenue, **Cambridge, Mass.** **JAMES A. PENNYPACKER**, Assistant Secretary, Room 561, 11 Broadway, **New York City**.

1926

It is worthy of note that among the younger classes '26 is one of the most active in the alumni affairs of the Institute. **Ted Mangelsdorf**, **Eben Haskell**, **Robert B. Morrissey**, and your Secretary are members of the Alumni Council. **Bob Dean** is on the Boathouse Committee and **Kenney Billings** and your Secretary are on the Alumni Advisory Council on Publications. **John E. Longyear** is Secretary of the Detroit Technology Association; **John R. Kimberly**, Secretary of the Technology Club of the Fox River Valley; **Richard H. Pough**, Secretary of the Technology Club of Philadelphia; and **Joseph Y. Houghton**, Secretary of the Washington Society of M. I. T. There is no reason, as the years roll by, that the Class should not take its place among the four or five others which have made notable contributions to the operation and welfare of the Institute.

1926 Continued

W. C. L. Hemeon announces his removal from Adams, Mass., to Rockland, Maine. — A clipping from the Portland (Maine) *News* records the marriage of Miss Carolyn Lord Hodgdon to Albert P. Libbey, with Frank Cramton as best man. The marriage took place in Portland on October 24. — The Secretary has also received an announcement of the marriage of Miss Alice Caroline Engdahl to Gosta H. Holmer. — J. RHYNE KILLIAN, JR., *General Secretary*, Room 11-203, M. I. T., Cambridge, Mass.

COURSE VI-A

In September, I had the good fortune to be in Philadelphia overnight, so I called up Jim Crawford and found to my surprise that he had joined the order of the Benedicts. I spent a very pleasant evening with him and his wife in their newly established quarters, and I am sure that we all extend to them our best wishes. Jim is still with the Bell Telephone Company and is having fun in the planning department and at present is on the outside planning on construction changes due to increased requirements and changes of rightways, and so on. (Jim, I hope my explanation is satisfactory.)

Also, last month when I called Frank Grueter, I was told that he was out of town for five or six weeks from which fact I gleaned that Frank was on test work in the field again. — Ed Wayne has come forth from oblivion with quite a tale of wanderings of which his letter will speak for itself.

"So many other long lost members of our group are being heard from that I thought I might as well add my bit of information. On graduating I worked for nine months in the Department of Grounds and Buildings, River Works, Lynn, as draftsman, investigator, and report writer; then I took a relapse into student days again and was on test two months in Pittsfield and one month in Schenectady to obtain training for my next position, engineer with the Texas Power and Light Company at Dallas. The job was to be field construction, but right after they hired me they curtailed their program, and the nearest I ever came to being in the field was doing a lot of line and transformer calculations in their Dallas office. While there I met Martin L. Grossman who spent a week or so of a flivver tour there.

"After three months with T. P. & L., I was laid off. Engineering jobs seemed scarce, so I took a job as 'grunt' with a Texas and Pacific Railroad pole setting crew. After a month of this I secured a position with Gannett, Seelye, and Fleming, Inc., a small firm of utility operators, with home office at Harrisburg, Pa. I was there for six months or so as draftsman, estimator, and so on, and then they sent me to Missouri, where I was a construction superintendent in charge of a small crew of linemen working in three very small towns. We put up various distribution extensions, two tie-ins to a high line, and two small substations. This took about ten months. I returned to Harrisburg and was laid off.

"After being out of work for several months, I secured my present job with the Philadelphia Electric Company. My official designation is electrical tester. The work consists of routine tests of equipment, very similar to the old test days, appliance testing, report writing, and a very small amount of original research. It is liable to lead to anything from night shift on a turbine floor to going down a manhole with eight feet of water in it, from testing pots on a range in the demonstration kitchen to finding out why a radio ham with a short wave set makes his neighbors' lights burn while they are trying to sleep at night.

"From sources which I believe to be reliable, but which I cannot guarantee, I have heard that Mendel Segal has been in New York City since graduation, is now in business for himself in some line pertaining to architecture, and was married a few months ago.

"The time I was out of work you received word of it, through Leo Teplow, I believe, and put a line into the class news to help me along. Many thanks for the same. I obtained my present job through a help wanted advertisement in a newspaper, showing that college men even come to that occasionally."

As for myself, I judge from the October issue that my attempts at merrymaking at the Reunion were rather marked and obvious to bring forth such flowing comments from our class scribe, Mr. Killian, but as previously stated, I enjoyed myself most thoroughly. Recently, another car sneaked out and banged mine on the right rear which sent it into a whirl of nearly 180° and sent me into a mental one for some days. The car sustained injuries which are repairable, but the damage done to my little baby's face caused by the flying glass will take many years to wipe away, if they are at all, which, of course caused us much mental anguish and concern. However, the cuts are healing nicely and we can only hope that the scars will disappear as she grows up. My wife and I were very lucky in that we received only a shaking-up and minor bruises. We are all thankful that it was no worse. It is a good thought for the month of November.

Let's hope that a few more members will come forth from obscurity and by their doings shine before us as examples. — BENJAMIN P. RICHARDSON, *Secretary*, Box 384, Congers, N. Y.

1928

My file of news is worth talking about this month for a pleasant change. However, in passing, I want to repeat my old request for some real coöperation from all of you on this matter of class news. A fresh and fertile imagination is valuable and useful in writing fiction, but when it comes to a column of class notes it takes facts and those facts must come from you!

Therefore, I'm requesting that within two days of the time you read these notes that you send me some sort of news of yourself. I'd prefer a letter with some real information about yourself, your

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work, your fiancée (?), or family (?), but if that's too much work, at least drop me a one-cent post card with all the dope. I will sort the replies and send them to the various course secretaries for compilation. Don't forget that this column is the one place where '28 can again get together in spirit. Remember I'm allowing you just two days to get off your letter or card! If you haven't done it by then, I hope that your conscience pesters you until you do!

Right on top of my pile of notes is a most interesting letter from our old pal, Dick Goble. After graduation Dick started with the Harris Trust and Savings Bank in Chicago, but after four months of that he decided that bonds and banking were not to his liking so he "donned overalls for about a year" at the Chicago Hardware Foundry Company to learn the vitreous porcelain enameling business. Later he was offered a job selling raw materials to that trade and so got into the chemical business. Dick now has the Chicago territory for the McGean Chemical Company of Cleveland which supplies industrial chemicals. He is now living at 230 North Canal Street, Chicago (Telephone, Franklin 6263) and would like to have any of the gang look him up when they are in the windy city.

Dick has also supplied the following information about other classmates. Bunny Burnell is fast learning the intricacies of banking and we are warned not to be surprised to hear soon of his being elected one of the innumerable vice-presidents of the Continental Illinois Bank and Trust Company. Is that right, Bunny? — Berne Landel is reported as being on the payroll of Sears Roebuck, and Bud Gray and family are back in Chicago. Bud is still with Sears Roebuck. Geny Patrick is in charge of costs and the accounting department for the Cleveland Automatic Machinery Company. Jim Kohler spends his time improving the Kohler line of bathtubs, sinks and other sanitary ware as well as doing some plain and fancy flying in his own Travel-air plane. And that, my friends, is what I call a good letter with real news and is an excellent example of what I would like to get from each and every one of you right away.

Gil Ackerman's new address is 6356 Broadway Terrace, Oakland, Calif. He was sent to San Francisco by the Luckenbach Company to take over the job of assistant marine superintendent of the west coast branch. Gil says the job is so new that he can't say much about it yet except that he is sure he is going to like the work.

Speaking of addresses, here's Tom Wood's: 4 Park Place, Corning, N. Y. Tom's letter was all "smiles" as he is very interested in his work in the production department of the Corning Glass Company with a happy family and a home almost owned! That's a record worth shooting at, isn't it?

And John Jacob Hartz has joined the Benedicts! The announcement before me states that John was married to Miss Margaret L. Parker on September 28 at Camp Woodley-on-Lake Kiwassa, Sara-

1928 Continued

mac Lake, N. Y. This new '28 family is now located in Akron, where John is working with the Goodrich Rubber Company. — Ed Lockwood, II, took his marriage vows with Miss Ann Franklin Hamilton of Brooklyn, in September. I have no information about the present address of this new couple.

William Beard is now an instructor at the California Institute of Technology teaching a course entitled "Government and Technology." Previous to that appointment, Sparks was associated with the Institute of Public Research in New York. He and his father, the well known Dr. Charles A. Beard, noted political scientist, have written a new book called the "American Leviathan" which deals with technological phases of government.

Saturday, November 28, Stanford came east to show Dartmouth and New England how football is played out on the sunkist slopes of the Rockies. The evening after the game we staged a miniature class reunion at the University Club Dartmouth-Leland Stanford dinner dance. The participants were none other than Ralph T. (himself) Joep, accompanied by his erstwhile political manager, Jim Donovan, with Bill Kirk, and yours truly. We had a great time swapping undergraduate reminiscences amid the wild-eyed Wah-hoo-wahs! Take a tip, however, and watch out for yourself if you go on a party with our esteemed President, Mr. Ralph Theodore Joep. That young man has been understudying Houdini and you're liable to have your soup spoon fall apart in mid-air or something equally disconcerting. What a funster!

Remember to send in news. Do it now!
— GEORGE I. CHATFIELD, *General Secretary*,
Room 11-203, M. I. T., Cambridge, Mass.

COURSE I

An event of importance transpired on October 3, when Miss Madeline Dietrich and Hal Porter were married at the Little Church Around the Corner. I had the honor and pleasure of acting as best man, and so was able to offer congratulations for all the gang immediately. The wedding wrote *finis* to the apartment Hal and I had enjoyed for the past year, but resulted in an even more enjoyable arrangement. It so happened that Hal and Babe (Mrs. Porter, to you) were going to live in the Dietrich home, and, as it is quite spacious, they invited me to become a member of the family. In that way, Hal's address and mine changed to 426 East 238th Street, New York City.

A most welcome letter from Pop Robinson lets us in on his adventures in the last three years. Pop, as I mentioned recently, is with the U. S. Bureau of Public Roads in Troy, N. Y. But here's the story in his own words. "I might as well start in at where I think you lost track of me and that was when I left Cambridge in the fall of 1928 to go out to Watervliet for the Morton C. Tuttle Company on an industrial building construction job. I started out giving lines and grades but discovered that it was going to be much warmer in the office so they sent me inside and kept

me there until the job wound up in February. A couple of weeks later I was in Buffalo with the U. S. Engineer Department and I spent a year and a half surveying, inspecting breakwater and building construction, and sounding various harbors on Lake Erie, Lake Ontario, and down the St. Lawrence. I had a yen for Buffalo, however, so I shifted to the Great Lakes Dredge and Dock Company and spotted piles for a month on the new Ford factory at Buffalo. George C. Diehl, Inc., engineers of Buffalo, then took me on for bridge survey work on the Niagara River. I had put in a couple of months struggling on the analyses of a couple of 550-foot concrete arches when the depression put a stop to operations and I came back to Massachusetts last New Year's. So I got back to Uncle Sam and now I'm helping the district bridge engineer and hope to keep out of trouble for a while." Pop doesn't seem to care much for Troy as a residential spot so lives at 746 West-ern Avenue, Albany, N. Y.

Hal received a letter recently bringing us our first news of Switzer. Fred can be reached c/o Pan American Petroleum Corporation, Oruba, Dutch West Indies. He has been on this job for three years but is reticent about making detailed reports on himself as he says: "Refinery engineering is interesting work but does not appeal to any but refiners." Really, Fred, that just whets the curiosity.

When Josephs was in town on his way to Cambridge where he's doing some more studying, he told me that he had seen Luby in the U. S. Engineers Office in St. Paul. Jack has been working (since midsummer) on the preliminary stages of the plan for a nine-foot channel in the Mississippi near there.

This will reach you near the end of the holiday season, so here's wishing the gang a Happy New Year. — GEORGE P. PALO, *Secretary*, 426 East 238th Street, New York, N. Y.

COURSE V

Sending a bill for long overdue class notes certainly brought immediate action from several conscience-stricken souls. However, we still are very much in the dark as to the fate of several of our confrères, since a diligent search of obituary notices has not shown that any of them have died a glorious death in the pursuit of their duties.

Batchelder crashed through and traced his existence since leaving the Institute in 1930 with an M.S. tucked under his arm. Batch says in part: "I am, as you probably heard, a benedict of some experience, living in the oil saturated town of Whiting, Ind., the habitat of such famous people as J. K. Roberts, Chuck Gale, and others. Your debtor is employed as a research chemist in the Standard Oil Company's high pressure laboratories. Occasionally subbing as a steam fitter, janitor, chamber maid, and errand boy." Batch's address is 1642 Stanton Avenue, Whiting, Ind.

Archibald crashed through in characteristic form. He is still working in Long Island City for the Magnetic Analy-

sis Company. From the tone of Arch's letter it sounds as though he were on the verge of suing me for libel. He says, "In your last efforts directed toward the furthering of the interests of good old Course V, you painted a somewhat wistful view of the undersigned indulging himself in the annoyance of editors. While such publicity is appreciated, it would do no harm to point out the folly of repetition, especially, of course, since the whole thing is a lie."

"I hope I shall be successful in keeping out of your clutches until you have forgotten at least a part of your trip to Europe. It is only a year since I lived through your operation and these things can't be repeated indefinitely."

Evidently life at the Institute is still one confounded thing after another and just as exciting, according to Jim Farnum, who confided in me to an alarming extent as follows: "I am still at the Institute. Call again in about a year. In the meantime there is no news. Then I may have a job, position, sinecure, or what do you call it to write about."

Patent Lawyer Fred Wolf may be studying and working like the devil, but he had better not forget that I have my agents out all over the country and succeed very well in checking up on activities of the boys. I had tea with a girl the other day who told me about the wedding of Ralph Peters in Cincinnati. In passing she made the remark that Fred Wolf was one of the ushers, and asked me if I knew him. So it appears wherever a good spree is on the offing, Fred Wolf is willing to let the law wind itself into a mess of red tape and do justice to the goblet.

With his well-systemized mind, Fred has given a good account of himself under every possible heading.

Personal Status: Still a bachelor and enjoying it with no imminent intentions.

Business Relations: No change. I am thankful I still have such a thing. (That means with Delos G. Haynes, Patent Attorneys in St. Louis.)

Scholarly Advancement: Believe it or not the old S.B. will have a companion next June, namely, L.L.B. — rather a strange mixture — but so are several good cocktails. Anyhow four years of law night school are about over and that they are about over is the best I can say for them.

Activities and so on: For ten months Secretary-Treasurer of the local Technology club in which capacity I can fairly claim to know just about as many Technology men as live hereabouts. As to personal activities of a private nature — that is, hobbies — about the only thing I have done is pictorial photography and reading articles about how long it will be before beer comes back.

Travel: Yes, to the East frequently. Washington, the Mecca of all patent lawyers, particularly, but I haven't made Europe since the depression set in.

I Have Seen: Former '28 men just don't gravitate to the metropolis of the Mississippi. Bob Joyce, I, is seen around quite a bit; Johnny Collins, ditto; Joe Harris is entering the local blue book

1928 • Continued

strata of society, to join Monk Condi who is now up to around page 2 of said book."

If some of you other buzzards would send in as exhaustive a treatise as Fred did, I could keep some papers on my desk to look busy when the boss dropped around.

We couldn't all stay pure and it looks as though Armand Monier is the one to slip. According to his letter, he is on the verge of becoming a Ph.D. Here's the story in his own words: "I decided to take a year of graduate work and received my M.S. in 1929. I scouted around for a while and had a crack at jobs from du Pont and Commercial Solvents, but finally decided to go on with research having the old Ph.D. as my ultimate aim, so during 1929 and 1930 I have been working under Avery Ashdown. Last year I took the bull by the horns and the faculty and tried my major exam. The profs must have been in a good mood for I had no difficulty. Now that's over I guess there'll be no doubt as to my receiving a degree in June. As to getting a job—that seems to be another question. Oh, yes, I am still single, but by design rather than accident." We might observe that Armand should get another degree for staying single as it's a clever man who can avoid marriage these days with all the girls out of work.

From the State of Colorado and the pen of Max Parshall comes the world's worst pun. Steel yourself and read it gently. "Just received your bill and will attempt to make a Parshall payment. I am still working for the Dairy Commissioner, helping to keep the creamery men in Colorado honest. R. T. Armstrong, V, '30 spent the summer with me, during which we were able to develop photographs on cloth in several colors. These colors are quite fast to light and washing. However, we did not let this and other work interfere with having a good time once in a while. We climbed Saw Tooth Mountain at Cameron Pass, and had several good fishing trips. We also had the pleasure of showing A. S. Houghton and wife a few of the beauties of northern Colorado. Houghton is in the chemistry department at Technology this year. I am still enjoying the life of a bachelor."

I suppose your Secretary should crash through with a little information about his own activities, so here goes. After returning from Bermuda last spring, I worked hard for three months and got all tired out again. The only way to correct that condition was to take the summer off and spend three months in Europe. Fortunately there was a little business to be handled at the same time, but you can take my word for it that the business was purely incidental. On returning at the end of September, you can imagine my surprise to discover that I still had a job. Since then I have been slaving away in characteristic manner, although I have taken the time to furnish an apartment of my own, which might indicate that I am reconciled to the dull and uninteresting life of a bachelor. Any of you who care to take exception to

the last statement might come around and investigate but remember it is strictly a B.Y.O.L. proposition.—ALBERT S. DEMPEWOLFF, *Secretary*, 225 East 54th Street, New York, N. Y.

1930

News is apparently as scarce as hen's teeth. Let's hear from some of the old gang. The only news your Secretary has this month is a rumor or two that he picked up in Akron while visiting Mr. and Mrs. Phil Holt, Jack Bennett, Ted Riehl, Fluque Rowzee, and Jim Holden. It seems that there had been a Technology banquet the night before, otherwise these worthy classmates of ours were feeling fine, in spite of the business depression and all its troubles, cuts, and free vacations.

A short note from Wes Wedemeyer indicates that although he still has a job, he has not joined the ball and chain gang yet. A telephone call from Al Stone informed us that he is now living and working in Buffalo.

We also note that Joseph Shelley has recently sailed for the Near East to join the excavation party of the American School of Classical Studies. He will go to Athens and then to Italy and Sicily on a fellowship.

Now again I ask you to write in to me or to your Course Secretary and give us the low down. We can't make news up, and we must depend on our classmates to supply the necessary dirt.—MORELL MAREAN, *General Secretary*, 1239 Norwood Avenue, Niagara Falls, N. Y.

COURSE XIV

The Course Secretary finally bursts into print with the startling announcement that he is working and has been since this past August. To those who know him, it may seem nothing short of miraculous. The place is the Waltham Watch Company, and let me add that the work is of an electrochemical nature. Besides watches and clocks, the factory also makes speedometers and many of the parts for the various pieces are plated. The metals deposited include chromium, nickel, black nickel, brass, copper, cadmium, gold, silver, and tin, the first apparently being the reason why I am here.

While walking down Main Street the other day I was pleasantly surprised to come face to face with Wallace Hope. He is also working in this fair city but is struggling with gausses instead of ions. At the present time he is designing relays for the Palmer Electric Company.

While I have the opportunity, let me add that the mail for this column has been very limited—one letter in the past year and a half. Small contributions will be gratefully accepted at the address below.—RICHARD R. HARTWELL, *Secretary*, 1 Upland Road, Waltham, Mass.

COURSE XVI

After nearly a month of frantic scribbling of heiroglyphics on penny post cards, I finally managed to get small fragments of news from a small number of

the men in the Class. Whether it's the depression or just a natural laziness on the part of the rest, I don't know, but anyhow, I'm still hoping that some of them will recognize my efforts.

First news from Paul Thompson was unsolicited—the first sign of a break I've had so far. He has a very interesting job at the Naval Aircraft Factory in Philly. Previous to this he worked for a few months immediately after graduation in the wing department of the Ford Motor Company. Then, after a short loaf he got a job working for the Government on a survey in the Allegheny National Forest. In the summer of last year, Paul got the idea that he ought to take up teaching, so he started in on education at Oberlin College, but he had hardly made a dent in this field when he got the job with the Navy, and he's still with it.

Linderoth is still designing streamlined toothpaste tubes with a title that sounds very important. He's chief engineer of the Peerless Tube Company, Bloomfield, N. J., and is doing a little mechanical engineering along with some electrical and a little hydraulics. He claims to have designed, single-handed, two conveyor systems, laid out and put in operation a rolling mill, and designed and built an annealing furnace. He's now working on a photo-cell application for inspecting his tubes and a new type of printing plate for lithographing them. Golly, I wish I were smart like that. It's lucky he took Course XVI for he never would have known all those things. Sounds just like a course in steam lab with T.M. lab thrown in for good measure. Lindy indicates that he doesn't consider marriage so much of a calamity. Anyhow, he does admit that he has met the girl.

Lindy says Garret Green lives right around the corner and is now a builder of ships for the Federal Steel Company in Kearny, N. J. — Jack Bloom up at Hempstead, L. I., says anyone in New York City should let him know. He wants a bust and wants some one to help him at it. He's about ready to sell red apples like the rest of the old men about town.

Hugh Mulvey is still with the Kellet Autogiro, according to Thompson, and from newspaper reports of that particular job, I guess he must have given them some real engineering. — James G. Papadopoulos, better known as Pap, turned up the other day way down in sunny Tennessee where he is keeping the Mississippi river running where it should. I judge that he's a big cog in President Hoover's flood-relief program. Needless to say, Pap seems well fitted for this job which he got by taking a Civil Service exam in mechanical engineering. He and Harmantas bummed around together for a year after graduation. For the first nine months they played poker together, using matches for money, and wrote letters all over the country. Pap says things looked so black that he bought himself a searchlight. Then these twins got jobs together with Curtiss-Wright in St. Louis, Mo. When old man Keys shut up shop they went on a Cook's tour

1930 Continued

of Chicago, Cleveland, New York, Toledo, and finally Boston, from which fair city Pap made a fast trip to Memphis.

Ronald Hepburn has taken an awful slump. He's now a civil engineer engaged in Brooklyn subway construction. Seems as though this man hates to stay on the surface of the earth; at least, he certainly goes in for research as to what's above it and what's below. Maybe he'll find out which way to head in on the great judgment day. He gets up to Boston quite frequently so some of you birds ought to get in touch with him. Hep reports that Limpisvasti has probably set sail for his native land.

And just as we go to press comes a letter from Red Deyarmond containing a lot of news and some unsavory wise-cracks about the navy which may or may not have been meant as personal touches. Wouldn't you know that guy would try to run me down when he knows I can't get my hands on him. Red has been working since April, 1931, on and off, for a light airplane company in Lowell. He did everything from sorting nails to least work analysis problems and is now waiting for someone to finance the job. Previously, he worked a couple of months winding baseballs and cutting covers for them out in Utica, N. Y., and then worked for a while for some construction outfit in the same place. He also put in a spell at odd jobs while work was slack just before April.

Red's plane is a 55 h.p. low wing cabin job weighing about 1,500 pounds. (Figure it out for yourself — the wing loading is only 27 and a fraction pounds per horse power.) It flies well, though, and they are thinking of putting in a bigger engine. Red's not married, but he's supporting a car, which apparently amounts to the same thing, so far as he's concerned. He plays football with a bunch of other roughnecks who call themselves the Norwood A. A. and haven't been scored on yet. He doesn't mention whether or not they've played any games!

Red reports that he sees Bill Driscoll about every time he gets enough gas to drive over to Framingham. Bill is sales engineer for a Boston steel company. Fred Dickerman is reported to be in Boston looking for another soft berth such as he had last year, but Red doesn't say if Fred's harem left him peaked or not. And Red heard from Bill, who saw George Brady, that George is still building those adorable tin geese for Mr. Henry Ford out in Dearborn.

As for myself, I'm flying for the Navy. We have six Martin patrol boats and we fly regularly about 50 hours each month. The flying isn't awfully exciting, but it's interesting and I'm certainly learning an awful lot. Every hop brings out a very good point that I'd missed till then. Recently on a cross-country hop to New York I got mixed up as to the location of the airport and wandered around the harbor at 135 miles an hour at about 100 feet altitude for 40 minutes. I didn't get my bearings until the Statue of Liberty went by my starboard wing

about 20 feet away. The fog was pretty heavy and my Curtis Hawk was the only thing between me and the water, but nothing much happened. Then last week I was fortunate enough to get another hop and I finally ended up in Floyd Bennet Field about 30 minutes after dark — it had only taken me an hour from Philadelphia at that. Those things are really loads of fun and are the only excitement we get around here. If my luck holds out, I'll have about 600 hours at least by the time my year is up next June. Anyone hearing of a job where a flying engineer of the highest quality is needed will please communicate with me immediately!

Let's hear from some of the rest of you blokes. — FRANK H. HANKINS, JR., *Secretary*, VP 10-S, Fleet Air Base, Hampton Roads, Va.

Dayton Technology Association

On Friday evening, November 20, the Dayton Technology Association was the guest of the Dayton Section of the American Chemical Society at a talk by Professor S. C. Prescott '84 on "Coffee." The meeting was held at the Engineers Club and was attended by 250 members and guests who manifested great interest in the varied and oft-times homely aspects of the situation. An informal dinner in honor of Professor Prescott preceded the lecture. At the dinner Professor Prescott told the Alumni of the many interesting and very constructive advances recently made at the Institute. — Philip K. Bates, '24, *Secretary*, Frigidaire Corporation, Dayton, Ohio.

The Technology Club of Rochester

The annual meeting of the Technology Club of Rochester was held on October 24, at the summer home of Mr. William Vicinus, Durand Eastman Park, Rochester, N. Y. On account of inclement weather, the usual afternoon of baseball and games in the field was not possible. However, Mr. Vicinus's cottage was ample for the occasion and the boys swapped stories and played bridge until shortly after five, when a delicious dinner of clams, lobster, chicken, and other less important viands were served. After everyone had loosened his belt at least three times, the annual meeting was called to order by first Vice-President Vicinus, in the absence of President Ray.

The communication from Dr. Allan Winter Rowe, which pointed out the great need of the Athletic Fund and the declining contributions, was read by the Secretary. The Club voted the regular contribution of \$50 to this fund and a special emergency contribution of \$25. The Treasurer's report was then read and it showed the Club to be in a very healthy financial state.

Mr. Ancona, who has been chairman of our Scholarship Committee for a number of years, reported as to the satisfactory record of the men who have been at the Institute on Rochester Technology Club Scholarships, and

pointed out that, although we have only awarded one scholarship this year, three of the men who applied for the scholarship are attending the Institute.

This was followed by the annual election of officers, which gave the Club the following officers for the coming year: President, Charles K. Flint '01; First Vice-President, William Vicinus '23; Second Vice-President, King Cromton '22; Secretary, Kenneth J. Mackenzie '28; Treasurer, Hazen Pratt '22; and Member of the Executive Committee, Sidney Alling '11.

Twenty-one new men were admitted to membership in the Technology Club of Rochester at this meeting. These represented largely recent graduates of the Institute who have come to work in this vicinity. — KENNETH J. MACKENZIE, '28, *Secretary*, Building 62, Kodak Park, Rochester, N. Y.

Detroit Technology Association

Our first meeting of the 1931-32 season was well attended and from the spirit exhibited was well enjoyed by all those present. Mr. Swift '15 was our guest speaker. He had three reels of movies taken at Technology during the last year, all of which were very interesting, especially the colored reel of President Compton's inauguration. Our President, E. F. Doten, has moved to Cleveland. His address is now The Allerton, Cleveland.

Our club has financed a year's subscription to The Technology Review, to the Cass Technical High School and the Northwestern High School. The Review gives us special rates for such subscriptions and those present at the last meeting felt that such action was wise, especially from the advertising standpoint.

A communication from Dr. Rowe was read regarding our subscription to the Alumni Athletic Fund. While those at the last meeting were desirous to make a subscription, it was felt unwise to do so until our Treasury shows a larger balance. The question is on the table and will be brought up again at a later meeting.

Our committee on speakers has been most fortunate in the arrangements for our next meeting. They have obtained Dr. Frank D. Adams, Chairman of Mayor Murphy's Unemployment Committee, to come and tell us of the work of his committee. We have all wondered just how this committee functions, and it will indeed be a privilege to have our questions answered by such a man as Dr. Adams. — JOHN E. LONGYEAR, '26, *Secretary*, 2000 Second Avenue, Detroit, Mich.

Montana Society of the M. I. T.

Professor James L. Tryon, Director of Admissions, came to Montana, saw it and was partly conquered by its citizenry and majestic scenery. We say partly conquered, as the people of Montana also were conquered by his personality and some of the to-the-point interviews which he gave out here.

Landing in Bozeman on October 14, he was well taken care of by the students of the Bozeman division of the University of Montana and between breaths of making speeches was taken for scenic drives through that portion of the state, including Yellowstone National Park and the home of the Vigilantes and placer mines at Virginia City, where dollars grew in the ground and men hung on trees.

He came to Butte by auto, accompanied by Professor Thaler '22. However, the axle broke midway between Butte and Bozeman and the travelers waited on the road for succor. Along came a car driven by the chauffeur of one of our prominent Butte citizens, picking up Professor Tryon while Thaler returned to Bozeman in another car. In the rescue car Professor Tryon was introduced to Mrs. James G. Graham, of Butte, mother of Thomas K. Graham, now a freshman at Technology. It's a small world after all.

On the night of the 18th, Professor Tryon gave an interview to the *Montana Standard*, Montana's leading newspaper. This interview was widely commented on, not only in Butte, but was copied by all the leading papers in the state and we have had many requests for copies of it from without the state.

After making four speeches in Butte on the morning and afternoon of the 19th, he was turned over to the Alumni to enjoy a complimentary dinner, of which the paper said: "Although the ardor of

the members of the Montana Alumni Society of the Massachusetts Institute of Technology was considerably sombered by news of the sudden death of Samuel W. Stratton, head of the institution, the 'Forward Technology' spirit dominated the dinner given October 19 in the main dining room of the New Finlen hotel to welcome Professor James L. Tryon, Director of Admissions of M. I. T., a visitor in Butte.

"The usual camaraderie of the graduates of the Institute was replaced by a meeting given over to educational subjects and affairs of the local alumni society. William L. Creden, state Vice-Chairman, presided at the business meeting, appointing Frederick C. Jaccard and W. A. Kemper, Butte, and Dr. Charles G. Clapp, Missoula, to draw up resolutions on the death of Dr. Stratton. A letter of felicitation was sent to Albert E. Wiggin, Great Falls, state Chairman, who is just recovering from an illness of over two months' duration and could not be present at the gathering.

"A period of silent devotion for Thomas A. Edison preceded the speaking program. Mr. Edison was a good friend of Technology, having donated many pieces of equipment to the various laboratories.

"Mr. Creden introduced and complimented W. Arthur Kemper, who arranged and personally supervised the carrying out of Dr. Tryon's program in Butte. Mr. Kemper talked on the desire of having all prospective students of the Boston

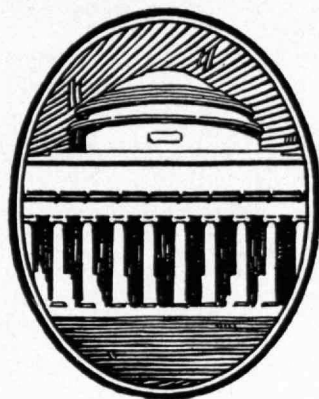
school thoroughly understand what is necessary in the way of aptitude and preparatory training to enter and complete a course at Technology.

"Dr. Charles G. Clapp, President of the Montana State University, Missoula, gave some reminiscences of his experiences at the college and what great benefits he had derived therefrom.

"Dr. Francis A. Thomson, who was a guest at the dinner, complimented Professor Tryon on his statement yesterday at the preparatory schools and School of Mines in Butte and especially on the terse statements appearing in the local newspapers in which he outlined what is necessary to achieve success in an engineering education and engineering practice.

"Professor Tryon gave a summary of his various trips around the country on missions like the present, this being the fifth year of his travels. He also stated that there were now 71 different courses of learning at Technology.

"Members attending the dinner last night were: T. J. Murphy '28, Great Falls; Dr. Charles H. Clapp '05, Missoula; W. L. Creden '90, W. A. Kemper '04, Frederick C. Gilbert '98, Walter R. C. Russert '18, Carl J. Trauerman '07, Frederick C. Jaccard '07, George H. Holmes, Jr. '24, Butte. The following guests were present: Dr. Francis A. Thomson, Samuel Barker, Jr., James G. Graham, and the honored visitor." — CARL J. TRAUEMAN, '07, *Secretary*, 25 East Broadway, Butte, Mont.



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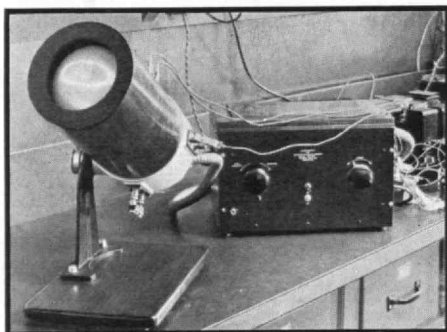
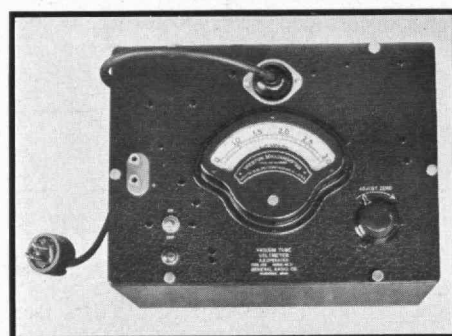
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